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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR § 1 53(b))

Attorney Docket No.	*1753.0050000/JRK/AJF*
First Inventor or Application Identifier	*Anthony C. FASCENDA*
Title	*System, Method and Apparatus for Automatically and Dynamically Updating Options, Features and/or Services Available to a Client Device*
Express Mail Label No.	

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO. Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☐ * Fee Transmittal Form (*e.g.*, PTO/SB/17)
(Submit an original, and a duplicate for fee processing)

2. ☒ Specification [Total Pages 46]
(preferred arrangement set forth below)
- Descriptive title of the Invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings *(if filed)*
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 19]

4. ☐ Oath or Declaration [Total Pages _____]
a. ☐ Newly executed (original or copy)
b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional with Box 17 completed)*
[Note Box 5 below]
i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR §§ 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference *(useable if Box 4b is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein

6. ☐ Microfiche Computer Program *(Appendix)*

7. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
a. ☐ Computer Readable Copy
b. ☐ Paper Copy (identical to computer copy)
c. ☐ Statement verifying identity of above copies

jc133 U.S. PTO 09/523168 03/10/00

ACCOMPANYING APPLICATION PARTS

8. ☐ Assignment Papers (cover sheet & document(s))
9 ☐ 37 CFR 3 73(b) Statement (when there is an assignee) ☐ Power of Attorney
10 ☐ English Translation Document *(if applicable)*
11 ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
12 ☐ Preliminary Amendment
13. ☒ Two Return Receipt Postcards (MPEP 503)
(Should be specifically itemized)
14 ☐ *Small Entity Statement(s) *(PTO/SB/09-12)* ☐ Statement filed in prior application, Status still proper and desired
15 ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☒ Other 37 C F R. § 1 136(a)(3) Authorization
☐ Other

**NOTE FOR ITEMS 1 & 14 IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C F R § 1 27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R §1.28)*

17. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment.*

☐ Continuation ☐ Divisional ☐ Continuation-in-Part (CIP) of prior application No: ____/_____

Prior application information: *Examiner* _____ *Group/Art Unit:* _____

18. CORRESPONDENCE ADDRESS

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**REGISTERED PATENT AGENTS

March 10, 2000

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Box Patent Application

Re: U.S. Non-Provisional Utility Patent Application under 37 C.F.R. § 1.53(b)
Appl. No. To be assigned; Filed: Herewith
For: **System, Method, and Apparatus for Automatically and Dynamically Updating Options, Features, and/or Services Available to a Client Device**
Inventor: Anthony C. Fascenda
Our Ref: 1753.0050000/JRK/AJF

Sir:

The following documents are forwarded herewith for appropriate action by the U.S. Patent and Trademark Office:

1. USPTO Utility Patent Application Transmittal Form PTO/SB/05;

2. U.S. Utility Patent Application entitled:

System, Method, and Apparatus for Automatically and Dynamically Updating Options, Features, and/or Services Available to a Client Device

and naming as inventor:

Anthony C. Fascenda

the application comprising:

a. specification containing:

(i) 38 pages of description prior to the claims;

(ii) 7 pages of claims (28 claims);

(iii) a one (1) page abstract;

b. 19 sheets of drawings: (Figures 1A, 1B, 2A, 2B, 3, 4A, 4B, 4C, 4D, 5, 6A, 6B, 7A, 7B, 8, 9A, 9B, 9C, 10, 10A, 11, 11A, 12-14;

3. 37 C.F.R. § 1.136(a)(3) Authorization to Treat a Reply As Incorporating An Extension of Time; and

4. Two (2) return postcards.

It is respectfully requested that, of the two attached postcards, one be stamped with the filing date of these documents and returned to our courier, and the other, prepaid postcard, be stamped with the filing date and unofficial application number and returned as soon as possible.

This patent application is being submitted under 37 C.F.R. § 1.53(b) without Declaration and without filing fee.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Jeffrey R. Kurin
Attorney for Applicant
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Enclosures
JRK/AJF:vrb

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SKGF Rec 3/7/00 dcw

System, Method, and Apparatus for Automatically and Dynamically Updating Options, Features, and/or Services Available to a Client Device

Inventor:

Anthony C. Fascenda

Related Applications

The following applications of common assignee may contain some common disclosure and may relate to the present invention:

U.S. Patent Application No. 09/195,483, entitled "Method and System for Providing Localized Information", filed November 17, 1998; and

U.S. Patent Application No. 09/195,482, entitled "Method And System For Providing Formatted Information via a Two-way Communications System", filed November 17, 1998, each of which is incorporated herein by reference in its entirety.

Additionally, the following applications of common assignee may contain some common disclosure, and are believed to have an effective filing date identical with that of the present invention:

U.S. Patent Application No. 09/____,____, entitled "System and Method for Providing Focused Information Based on Implicit and Explicit Information Derived From User Histories (Attorney Docket No. 1753.0040000);

U.S. Patent Application No. 09/____,____, entitled "System and Method for Providing Information that is Responsive to a Freeform Request" (Attorney Docket No. 1753.0060000);

U.S. Patent Application No. 09/____,____, entitled "System, Method, and Apparatus for Maintaining a Database of Past Transactions in a Client Device" (Attorney Docket No. 1753.0070000);

U.S. Patent Application No. 09/____,____, entitled "System, Method, and Apparatus for Initial Configuration of a Client Device" (Attorney Docket No. 1753.0080000);

U.S. Patent Application No. 09/____,____, entitled "System, Method and Apparatus of Providing Value Added Services to Specific Users" (Attorney Docket No. 1753.0090000); and

U.S. Patent Application No. 09/____,____, entitled "Method and Apparatus for Providing Services to a User of a Client Device Configured by Templates that Reference other Templates" (Attorney Docket No. 1753.0100000), each of which is incorporated herein by reference in its entirety.

Background of the Invention

Field of the Invention

The present invention relates generally to a system including inter-communicating client and server applications, and more particularly, to such a system, a method, and an apparatus for automatically and dynamically updating options, features, and/or services available to a client device.

Related Art

A typical client-server environment includes a client application, such as an Internet web-browser, and a server application respectively executing on independent computer based platforms and communicating with one another. The client application submits information requests to the server application in response to user input at the client end. In response, the server transmits information responses to the client application. The user interacts with the client-server environment using a Graphical User Interface (GUI) of the client application.

A large number of client and browser applications can operate in a distributed service environment. A distributed service environment is one in which the numerous client applications interact with one or more server applications, each of the server applications hosting a wide variety of data services provided by

a variety of "private" and possibly public service providers. Wireless client devices including the above mentioned client applications can operate in such a distributed service environment. The user interacts with available services via the client application user interface.

Often, new services are added and existing services are expanded to include new service options and features in the distributed services environment. It is important that such added and expanded services be made available to the user. Usually, to achieve such a goal, both the server and client applications must be reconfigured in accordance with the service changes or upgrades. One burdensome approach includes tediously redeveloping both server and client applications (for example, computer programs). Redeveloping a client application can be particularly difficult when the client application executes on a custom device, such as a wireless pager, instead of a well-known development platform, such as a personal computer. For example, developing the client application for a pager requires knowledge of custom circuitry in the pager.

In addition, reconfiguring numerous geographically distributed client devices with a redeveloped client application typically entails a large expense and presents many logistical difficulties. One disadvantageous approach to reconfiguring service capable pagers, for example, requires the user to return the pager to a service center or dealer. Another disadvantageous approach requires downloading redeveloped client applications or configuration information in a broadcast manner to an entire, large population of client devices. This can be prohibitively expensive and wasteful of transmission bandwidth. Also, there is no need to perform such a download to an unused client device, or to a client device not requiring access to an updated service, for example.

It is also important to maintain configuration control over the numerous distributed client devices in a distributed services environment. A central facility, or the like, usually tracks the various service configurations for all of the service users (client applications).

Therefore, there is a need to reconfigure a client device to accommodate new and expanded services in a distributed service environment.

There is a further need to reconfigure such client devices in a manner that is transparent to the user, thereby reducing user inconvenience relative to known reconfiguring techniques.

There is an even further need to reconfigure client and server devices without redeveloping and distributing client and server application software.

There is a related need to maintain configuration control over distributed client devices with regard to service capability of the client device. It is desirable to maintain such service configuration using a convenient, flexible, and comprehensive technique, that encompasses a quickly changing service environment.

There is a further need to selectively update or reconfigure only those client devices requiring the update, that is, only those client devices operating and accessing updated features, services and options.

Summary of the Invention

The present invention is directed to a system, a method, and an apparatus for automatically and dynamically updating options, features, and/or services available to a client device operating in a client-server environment. In the present invention, one or more client devices are reconfigured to accommodate new and expanded services in a distributed service environment. Each client device is advantageously reconfigured in a manner that is transparent to the user, thereby reducing user inconvenience relative to known reconfiguring techniques. The client devices are advantageously reconfigured without redeveloping and distributing client and server application software. The present invention advantageously avoids wasteful and expensive broadcast downloads of reconfiguration information. Instead, the present invention selectively updates or reconfigures only those client devices requiring the update

The present invention offers the further advantage of maintaining configuration control over distributed client devices with regard to service capability of the distributed client devices. In the present invention, configuration control is maintained using a convenient, flexible, and comprehensive technique, that encompasses a quickly changing service environment.

One embodiment of the present invention is a method of automatically reconfiguring a client device in a client-server system including one or more client devices, each associated with a unique client identifier and having a client template database for storing one or more templates defining a configuration of the client device, and a server having a server template database. The method comprises the steps of receiving a client request including a template identifier from a client device, and retrieving a template corresponding to the template identifier from the server template database. The method further includes determining whether the client device requires a template update using the template identifier and the retrieved template, and sending a server response including template update information when the client device requires the template update as determined previously, to thereby reconfigure the client device. This embodiment provides an advantageous mechanism whereby templates stored at the server and later modified are downloaded only to users accessing such templates and services associated with the templates.

Another related embodiment of the present invention is a method of reconfiguring a client device, including the steps of sending a client request from the client device, and receiving a server response from a server, wherein the server response includes a template identifier. The method further includes determining whether the server response includes template update information, and updating a template corresponding to the template identifier in a template database with the template update information when the server response includes the template update information as determined previously, to thereby reconfigure the client device.

Additional related embodiments of the present invention directed to a system, and client and server apparatuses are also provided.

Additional features and advantages of the present invention, as well as the structure and operation of various embodiments of the present invention, are described in detail below with reference to the accompanying drawings.

Brief Description of the Figures

The features, objects, and advantages of the present invention will become more apparent from the detailed description set fourth below when taken in conjunction with the drawings in which like reference characters identify corresponding elements throughout and wherein:

FIGS. 1A and 1B illustrate exemplary communications systems in which the present invention is useful;

FIG. 2A illustrates an exemplary two-way communications client device for use with the present invention;

FIG. 2B is an illustration of a paging device manufactured by Research In Motion (RIM), Limited, of Waterloo, Ontario, Canada.

FIG. 3 is an illustration of a logical architecture corresponding to the communication system of FIGs. 1A and 1B and the communications device of FIG. 2A.

FIG. 4A is an illustration at a high level of an embodiment of a template used in the logical architecture of FIG. 3.

FIG. 4B is a diagrammatic representation of an exemplary content portion of a template used in the logical architecture of FIG. 3.

FIG. 4C is an illustration of a completed template or display page corresponding to the template of FIG. 4B.

FIG. 4D is an illustration of a list of exemplary definitions or descriptors defining the template of FIG. 4B and the display page of FIG. 4C.

FIG. 5 is an illustration of an exemplary hierarchy of display pages.

FIG. 6A is an illustration of an exemplary user interface including linked pages defined by a hierarchy of templates, before a template update in accordance with the present invention.

FIG. 6B is an illustration of the exemplary user interface of FIG. 6B, after the template update.

FIG. 7A is an illustration of an exemplary information table stored in a server transaction database used in the logical architecture of FIG. 3.

FIG. 7B is an illustration of an exemplary information table stored in a server template database used in the logical architecture of FIG. 3.

FIG. 8 is an illustration of an exemplary information table stored in a client transaction database of the client device of FIG. 2A.

FIG. 9A is an illustration of an exemplary information request message transmitted by a client application used in the logical architecture of FIG. 3.

FIG. 9B is an illustration of an exemplary information response message transmitted by a server application used in the logical architecture of FIG. 3.

FIG. 9C is an illustration of another exemplary information response message including a template update, in accordance with the present invention.

FIG. 10 is a flow chart of an exemplary method of requesting information at a client in the logical architecture of FIG. 3, according to an embodiment of the present invention.

FIG. 10A is a flow chart of an exemplary method of receiving and responding to an information response at a client in the logical architecture of FIG. 3, according to an embodiment of the present invention.

FIG. 11 is a flow chart of an exemplary method of responding to an information request of FIG. 10 at a server in the logical architecture of FIG. 3, according to an embodiment of the present invention.

FIG. 11A is a flow chart of an exemplary method of responding to an information request of FIG. 10 including a Get_template command at a server in the logical architecture of FIG. 3, according to an embodiment of the present invention.

FIG. 12 is a flow chart of exemplary method steps expanding on the method of FIG. 11.

FIG. 13 is a illustration of exemplary display pages at a client device before and after receipt of an information response at the client device.

FIG. 14 is an exemplary computer system, which may be used to perform the operations of the present invention.

Detailed Description of the Preferred Embodiments

I. Introduction

The present invention relates to a method and system for automatically initializing and configuring a client device (e.g., a two-way paging device, a wireless phone, a personal data assistant, or a desk top computer). The present invention can be used in a two-way wireless communications system. Additionally, the present invention can be used in various other types of communications system. For example, the present invention can be used with the Internet. In an embodiment where the present invention is used with the Internet, a client device can be, for example, a wireless device that wirelessly accesses the Internet (e.g., a PalmPilot® or a wireless phone) or a personal computer that is wired to the Internet.

Preferred embodiments of the present invention are discussed in detail below. While specific steps, configurations and arrangements are discussed, it should be understood that this is done for illustrative purposes only.

II. Exemplary Communications Systems

An exemplary wireless communication system 100 in which the present invention is useful is illustrated in FIG. 1A. Communications system 100 includes a plurality of cell sites102 each having a coverage area that is typically about 5 to

10 miles in diameter. A coverage area of one cell site often overlaps a portion of a coverage area of another cell site, which are illustrated for exemplary purposes by the hexagonal regions. Each cell site 102 includes an antenna 104 for transmitting and receiving messages to and from two-way wireless client devices 108 (e.g., a two-way pager, a wireless phone, a hand held computing device) that are located within a geographic coverage area of the cell site 102. Alternatively, separate antennas may be used for sending and receiving messages, as would be apparent to a person skilled in the relevant art. Each cell 102 is coupled to communications network 110, which can be, for example, an X.25 packet switched network. Communications network 110 may include, but is not limited to, land based links such as fiber optics or terrestrial microwave, and/or satellite based links, as would also be apparent to a person skilled in the relevant art.

Each cell site 102 is in communications with a message system center (MSC) 120 that includes a subscriber database (also referred to as a user database) that maintains records of all subscribers (also referred to as users) on the system, a unique identity sequence for the subscriber's client device, and an indication of the cell site from which the client device last sent a message (such as an acknowledgment message or a request message). Preferably, communications between each cell cite 102 and MSC 120 is accomplished through communications network 110. Alternatively, each cell site 102 can have a dedicated link to MSC 120.

Communications network 110 can be coupled to a public switched telephone network (PSTN) 112 so that a message can be sent to and from client device 108 via PSTN 112.

A message can also be sent from one client device 108 to another client device 108 using communications system 100.

In one embodiment, communications system 100 is the Bell South Wireless Data network (also known as the RAM Mobile Data network) or the ARDIS network, which are both well known two-way nationwide wireless packet data networks.

A client device (e.g., two-way wireless communications device) 108 typically identifies itself to MSC 120 by sending a registration or identification signal. Such signals include a data field including at least one unique identifier, such as a Mobile Identification Number (MIN) and/or Electronic Serial Number (ESN). A MIN, which can be reprogrammed, is analogous to a telephone number. An ESN is hard-coded and fixed such that it difficult, if not impossible to change. Some devices include both a MIN and an ESN. The client device used in an embodiment of the present invention, discussed in more detail below, only includes one unique identifier, known as a Mobile Access Number (MAN), which is similar to an ESN in that it is hard-coded and fixed. The identification signal sent by client device 108 can include one or more of the above discussed unique identifiers, or any other similar unique identifier. Such identification information can be periodically transmitted by client device 108 and/or included with other types of messages sent by client device 108. Such unique identifiers are also sent with each request sent by a client device 108.

An optional function of MSC 120 is to determine whether the unique identifier of a client device is valid. A received unique identifier, such as a unique identity sequence comprising a string of digitally represented alphanumeric characters, can be compared to a maintained database of unique identifiers (*i.e.*, MINs, ESNs, MANs) to detect fraud.

MSC 120 can keep track of the approximate whereabouts of each client device 108 by keeping track of which cell site 102 a message, sent by a client device 108, originated. When MSC 120 is thus informed of the approximate whereabouts of each individual client device 108, it can later limit the number of cell sites 102 from which it transmits a message addressed to a particular client device 108. MSC 120 can even limit the transmission of a message to only one cell site 120 having a coverage area within which the particular client device 108 is believed to be located. The coverage area of a limited number of cell cites 102 (possibly only a single cell site or a last know site and its adjacent sites) shall be referred to as a targeted coverage area. Thus, the targeted area can be the area

covered by a single cell site or a slightly larger area that is also covered by a few adjacent cell sites. This limited or "targetted" transmission is much more efficient than broadcast-type transmission where a message is transmitted from every cell site, regardless of a location of a client device 108 to which the message is addressed.

Servers 114 (typically controlled by a service provider) are supported by communications system 100. That is, communications system 100 provides for message delivery between a server 114 and one or more client devices 108. Servers 114 can communicate directly with client devices 108 or indirectly with client devices 108 via communications network 110. Alternatively, servers 114 can communicate with communications network 110 through PSTN 112. In one embodiment, a server 114 provides information to a client device 108 upon receiving a request from the client device 108. Additionally, servers 114 can initiate the sending of information (e.g., unsolicited information) to a client device 108. This can be done periodically or upon a triggering event. Additional details about the types of services and the information provided by services providers 114 are discussed below.

The present invention is also useful in data networks such as a local area network (LAN), a home area network (HAN), and a wide area network (WAN). For example, the present invention is useful in the largest present day WAN, known as the Internet, and in smaller WANs. The Internet is a world-wide set of interconnected computer networks that can be used to access a growing amount and variety of information electronically. One method of accessing information on the Internet is known as the World Wide Web (www, or the "web"). The web is a distributed, hypermedia system, and functions as a client-server based information presentation system. Information that is intended to be accessible over the web is generally stored in the form of "pages" on servers (e.g., general purpose computers). Users can access a web site using general-purpose computers, wireless hand held computing devices, Internet capable wireless phones (e.g., a Wireless Application Protocol (WAP) Internet enabled telephone),

and the like, referred to as clients, by specifying the uniform resource locator (URL) of the site. FIG. 1B is a network block diagram showing a plurality of clients 108 and servers 114 connected to the Internet 118.

When a client sends a request to a server the request specifies, among other things, a destination address (e.g., a URL) and a source address that can be used to identify a user. A part of the URL known as the Domain Name is passed to a domain server (DNS) to be translated to a network address. The network address specifies the Internet protocol (IP) address of the intended server. The client request is passed to the server having the network address.

Servers 114 maintain or otherwise have access to local or remote databases that store and/or provide various types of data. For example, referring to FIG. 1A, remote databases 130 are maintained by data sources 132. FIG. 1A also shows a local database 116 that is maintained by server 114. Servers 114 can communicate with data sources 132 through dedicated links or through communications network 110, for example. The type and number of databases, and the form of communication of data between the servers 114 and the databases, is implementation specific.

The invention covers the ability of a server system to provide information to client devices via a wireless communications system, which typically has a plurality of cell sites that are coupled to a communications network. The invention also covers the ability of a server system to provide information to client devices via a wired communications system, or via a communications system consisting of a combination of wired and wireless links. The functions performed by the server system can comprise software running on one or more general purpose computers or on telecommunications-specific hardware. Alternatively, the combination of the software and hardware to accomplish the functions of the present invention can be conceptualized as a union of server controllers that each perform a discrete task, such as: sending a request from a client device in response to user input at the client device; receiving the request at a server over the communications network; identifying a user based on the request; determining a

response based on the request; sending the response to the client device of the user, or the like. One, two, or more of these discrete tasks can be performed by a single server controller. That is, the tasks performed by a first server controller and a second server controller can be performed by a single server controller and still be within the spirit and scope of the present invention. Alternatively, the discrete tasks can be performed by any number of server controllers. A further description of exemplary software and hardware controllers is provided below.

III. Exemplary Client Devices

An exemplary two-way wireless communications client device 108 is illustrated in FIG. 2A. Client device 108 includes an antenna 202, a transmitter 204, a receiver 206, a microprocessor 208, a display 210 and a keypad 212. Transmitter 204 is controlled by microprocessor 208 and transmits messages using antenna 202. Messages received from a transmitter of the communications system 100 are received through antenna 202 or a separate antenna (not shown). The received messages are routed from antenna 202 to receiver 206 and processed by microprocessor 208, for example. Display 210 can be a liquid crystal display and is used for displaying, to a user (also referred to as subscriber) of client device 108, information received via communications system 100. Display 210 can also display lists and/or menus from which a subscriber can make selections and perform various functions. Other methods of presenting the received information, such as aurally through a speaker or through another type of display, are not precluded. Keypad 212 can include as few as one button, but may also include an entire alphanumeric keypad, touch pad, or can be integrated with a display, such as a touch-screen display. Client device 108 also includes a memory 214 that can store software and/or data. Microprocessor 208 can write to and read from memory 214.

In one embodiment, client device 108 is an Inter@ctive™ Pager 950 manufactured by Research In Motion (RIM), Limited, of Waterloo, Ontario,

Canada. The RIM Inter@ctive pager (RIM pager) is a commercially available device that provides for two-way wireless communications. The RIM pager, shown in FIG. 2B, includes a 31-key keypad 212, roller wheel 214 that is similar to a mouse, and screen display 210 with 8 lines of text by approximately 28 characters per line. The RIM page also includes a built-in internal radio modem for two-way wireless communications over a cellular network such as the BellSouth network. In another embodiment, client device 108 is a Palm Pilot™ computing device, manufacture by 3Com Corporation, of Santa Clara, California. Client device 108 can also be a wireless communication device such as, but not limited to, a wireless telephone, a data transceiver, and a paging receiver. Client device 108 can be fixed, portable, or mobile, such as a mobile telephone. Of course the use of other two-way communications devices is within the spirit and scope of the present invention.

For some embodiments, client device 108 can be a personal computer that, for example, communicates with servers 114 via a network such as the Internet 118. Client device 108 can also be a personal computing device that wirelessly accesses the Internet. Those of ordinary skill in the art will envision other implementations of client device 108 and appreciate that they are encompassed by the present invention.

IV. Embodiments of the Invention

A.1. Client-Server Architecture

The system described in connection with FIGs. 1A, 1B, 2A and 2B provides a plurality of ever expanding information services to a user of client device 108. In an example application, a user requests stock prices from server 114, using client device 108. In response, server 114 transmits the requested stock prices to client device 108. Client device108 then displays the stock prices to the user on display 210.

A logical architecture 300 of an embodiment of the present invention is depicted in FIG. 3. Logical architecture 300 corresponds to the system of FIGs. 1A and 1B. Logical architecture 300 includes a client application 304 residing in client device 108, and a server application 306 residing in server 114. Client application 304 (also referred to as client 304) and server application 306 are, for example, computer programs respectively supported by computer controllers and memories of client device 108 and server 114.

Server 114 (also referred to as server controller 114) comprises the hardware and/or software required to accomplish specific functions of the present invention. Server 114 can be conceptualized as a union of servers that each perform a discrete task. One, two, or more of these discrete tasks can be performed by a single server 114. That is, the tasks performed by a first server 114 and a second server 114 can be performed by a single server 114 and still be within the spirit and scope of the present invention. Alternatively, the discrete tasks can be performed by any number of servers 114. That is, the task performed by a single server 114 can be performed by a plurality of servers.

Similarly, client device 108 comprises the hardware and/or software (for example, client 304) required to accomplish specific functions of the present invention. In client device 108, client 304 (also referred to as client controller 304) can be conceptualized as a union of clients that each perform a discrete task. One, two, or more of these discrete tasks can be performed by a single client 304. That is, the tasks performed by a first client 304 and a second client 304 can be performed by a single client 304 and still be within the spirit and scope of the present invention. Alternatively, the discrete tasks can be performed by any number of clients 304. That is, the task performed by a single client 304 can be performed by a plurality of clients.

A.2. Client Overview

Client 304 includes a user interface 308 at client device 108 for allowing a user to interact with one or more information services supported by the system of the present invention. User interface 308 displays formatted information pages on display 210 and permits the user to navigate between such display pages. User interface 308 also provides the user with a mechanism to enter requests and/or commands using, for example, keypad 212 (see FIG. 2B).

Client 304 interfaces with a client template database 310 and a client transaction database 312 stored in a memory of client device 108. Client template database 310 includes a plurality of individual templates 314, typically associated with one or more information services provided by the system of the present invention. In the present invention, client device 108 (for example, client 304 and user interface 308) is configured, and can be updated or reconfigured, in accordance with individual templates 314. As will be further described below, each template 314 is typically associated with a display page, and uniquely defines the type of information and a layout or format of information presented to the user on the display page. Each template 314 can also define a set of available actions a user can initiate when viewing an associated display page, thereby allowing, for example, the user to request information from the display page and to navigate between display pages.

Client device 108 can transmit information request message 316 to server 114 when appropriate. Client device 108 also receives response message 318 (transmitted by server 114) and can store information in the response message in client transaction database 312, so as to preserve the information for later retrieval. Also, user interface 308 can display requested information to the user.

A.3. Server and Server Database Overview

Server 114 can communicate with a plurality of clients, e.g., client device 108, associated with a plurality of client devices 108. Server 114 distributes requested information to client devices 108, and maintains configuration control

over the client devices. To perform such tasks, server 114 interfaces with a plurality of information stores, including a server template database 330, a server transaction database 332, and an exemplary service information store 334.

Service information store 334 includes real-time data from data sources 132 (not shown in FIG. 3; see FIG. 1A). Service information store 334 can include data relating to finance and stocks, sports, weather, airline schedules, and the like. Service information store 334 can be a local database 116 or a remote database 130. When server 114 receives information request 316 from client device 108, server 114 retrieves the requested information from information store 334, and transmits the information to client device 108 using information response message 318. Since this information in response message 318 can include information relating to one or more data services, it is also referred to herein as "data service information".

Server transaction database 332 stores past transaction event data thereby enabling server 114 to track information server 114 has previously transmitted to each client device 108. Server transaction database 332 can include tables mapping individual client device unique identifiers (for example, MANs, MINs, or ESNs) to authorized services and associated templates. Server 114 can use such mapping tables to validate/authorize client requests. Server 114 maintains transaction event data for past and on-going transactions between server 114 and client devices 108 in server transaction database 332. Such data is used to track and control the various transactions in the system of the present invention and to build transaction history tables for each of the client devices 108.

Server template database 330 includes the latest or most current versions of the available templates in the system of the present invention. Server template database 330 can also include tables mapping individual client device unique identifiers to the most current template versions authorized for client devices 108 associated with the unique identifiers. As new services, features and options are added to the system of the present invention, new templates are stored in server template database 330 and/or existing stored templates are updated, to reflect the

additions. Therefore, at any given time, it is possible a client device 108 includes an old version of a template, that is, an out-of-date template that requires updating. When server 114 receives information request message 316 from client device 108, server 114 determines whether the template (at client device 108) associated with the request message is the most current template (for example, an updated template). If the template is an old version, server 114 retrieves the most current template from server template database 330, and then transmits an appropriate template update, along with the requested information, to client device 108 using response message 318. In this manner, server 114 distributes the most current template versions to client devices 108 on a per access and an as needed basis. Thus, server 114 efficiently distributes template updates to client devices 108 to render new service features and options available to the users, and maintain configuration control over the clients. Further details regarding initially configuring a client device with templates is provided in U.S. Patent Application No. 09/____,____, entitled "System, Method and Apparatus for Initial Configuration of a Client Device" (Attorney Docket No. 1753.0080000), which was wholly incorporated herein by reference above.

B.1. Template Overview

In the present invention, the templates stored in client device 108 define a configuration of the client device. The configuration of client device 108 can determine the data services a user can access using client device 108, including various data service options and/or features. Also, the configuration can determine the way in which client device 108 interacts with the user to provide data services to the user. This can include, but is not limited to, the types of pages displayed to the user, the appearance of the display pages, the types and/or arrangements of information displayed on the pages, the navigable hierarchy of display pages presented to the user, the types and/or operations of actions the user can initiate when the user is presented with the display pages, the types of requests

a user can enter via client device 108 and/or the content of client requests resulting from such entered user requests. The configuration of client device 108 can also determine how client device 108 responds to various user requests.

FIG. 4A is an illustration at a high level of an exemplary embodiment of template 314. Template 314 includes a template header 400 having a template identifier 400a, a template version identifier or number 400b, and an optional template title 400c. Template 314 also includes a content portion 402 and an action portion 404. Content portion 402 includes definitions or descriptors (such as textual, symbolic and/or graphical descriptors) that define a layout and appearance of an associated display page on display 210. In other words, content portion 402 specifies an arrangement of information fields on the associated display page.

On the other hand, action portion 404 includes definitions (such as textual, symbolic, and/or graphical descriptors) specifying a set of actions a user can initiate with respect to the associated display page. For instance, action portion 404 can include: menu action definitions 404a, such as menu pull-down actions and scroll-wheel shortcuts; keyboard action definitions 404b, such as keyboard shortcuts (e.g., press "W" for weather service requests); branching action definitions 404c, allowing the user to branch from the current template and display page to a next template and display page linked with the current template; and external references 404d, such as URLs. Such actions are available to the user at the display page associated with template 314.

Content portion 402 is now further described. Content portion 402 typically includes text (for example, field labels) and variable descriptors (for example, stock quote information). Content portion 402 defines a format for the variable information and text within the display page. Content portion 402 can also include references to tables and graphical entities stored in the client device memory.

A diagrammatic representation of the content portion of an exemplary template 406 is depicted in FIG. 4B. Template 406 includes a title 410 (that is

part of the header of the template) for displaying the text "PRECIOUS METALS". The content portion of template 406 includes the following definitions:

a field 412 for displaying current time;

a plurality of information field identifiers or labels 414 arranged in a column; and

a first set of information fields 416 for displaying variable information (such as stock prices) and a second set of variable fields 418 for displaying further variable information corresponding to the information field identifiers.

Template 406 is incomplete because none of the information fields are populated with the specified variable information. When client device 108 receives requested information corresponding to template 406, client device 108 populates an instance of template 406 with the requested information, thereby creating a completed template. User interface 308 displays the completed template to the user as a display page. A display page/completed template 420 corresponding to template 406, is depicted in FIG. 4C. In display page 420, field 412, fields 416, and fields 418 are respectively populated with current time, hi/low stock prices, and stock price deviations.

In the present invention, each template can incorporate a unique set of actions available to the user when the template is displayed as a display page, as mentioned above. In other words, actions can vary from template to template and page to page in the present invention. Template actions are further described below.

FIG. 4D is an illustration of a list of exemplary definitions or descriptors that define template 406 (FIG. 4B), and thus display page 420 (FIG. 4C), as the template can be stored in either client or server template databases 310 or 330. The illustrated list of definitions correspond to a data service for precious metal prices. In header 400, "NT", "VERSION", and "TI" respectively specify the template name "temp1", version "1.1", and title "PRECIOUS METALS".

Content portion 402 (corresponding to labels 414, and fields 416 and 418 of FIG. 4B) includes a plurality of content definitions 436 for metal pricing information. A spaced pair of percent symbols (%) delimits each information field. For example, the definition "<SILVER%0:11%%1:6%" causes two variable fields of information to be displayed after the text "SILVER" on the display of client device 108. Action portion 404 includes exemplary action definitions 442 and 444. The actions defined by action definitions 442 and 444 are available to the user when the display page associated with the template (for example, display page 420 of FIG. 4C) is being displayed.

Action definition 442 defines a menu choice "refresh" in a list of displayed menu items. When "refresh" is selected in one embodiment, client device 108 retrieves the most recently received information relating to template $temp_1$ from client transaction database 312, and refreshes the display with the retrieved data. In another embodiment, selecting "refresh" causes client device 108 to first update the display with information retrieved form client transaction database 312 as just described, and then transmit an information request for new information to refresh the displayed information. In still another embodiment, the first step is omitted from the just described two-step embodiment.

Action definition 444 defines a shortcut key as "SP", the "space bar" key (also referred to as the "symbol key") on keypad 212, which when pressed, causes a branch to a predetermined home template or page called $temp_{home}$. Client device 108 then displays the home page associated with $temp_{home}$.

The templates of the present invention provide a powerful and convenient mechanism for configuring, reconfiguring, and updating client device 108 (including, for example, client 304 and user interface 308). As the system of the present invention adds new services and/or expands existing service options and features, correspondingly new and/or updated templates are automatically distributed to and stored in client devices 108. The new and/or updated templates correspondingly expand the service features and options available to the user so that the user can access the new and expanded services. In the present invention,

the new and/or updated templates are transmitted from server 114 in such a way as to be transparent to the user. Advantageously, the user is no longer burdened with physically returning the user device to a service center for such an update or with entering configuration data at client device 108. Also, developers are freed from the burden of redeveloping (and then distributing to many users) new versions of complex client application software and user interface software to accommodate every new feature or service upgrade. Instead, users can advantageously compose new and or updated templates in a convenient development environment (for example, on a personal computer) at the server end of the system. Advantageously, the templates are then automatically distributed to the users on a per user basis, as needed, as will be described further below.

In the present invention, templates 314 stored in template data base 310, and the actions specified in each of the templates, define an interconnected hierarchy of user navigable display pages at client device 108. FIG. 5 is an illustration of an exemplary hierarchy of display pages 502. In the example hierarchy, user interface 308 displays a home or welcome page 504 to the user when client device 108 is first powered-on. Home page 504 is a service starting page. Using actions, represented by connectors 506, defined for the home page by the associated home page template, the user can branch to a quote request page 508, a portfolio page 510, an informative "about" page 512, and a set-up page 514. The user can navigate between the aforementioned pages and a quote display page 516, a chart page 518, a user alert page 520, user page 522 and an add symbol page 524.

Templates and the actions defined thereby advantageously provide a convenient mechanism for altering user interface 308 and associated applications in accordance with expanding services, without changing the underlying user interface or client computer programs. An exemplary update to user interface 308 is now described with reference to FIGs. 6A and 6B. With reference to FIG. 6A, a user interface 602 is defined by a quote entry page 604, a quote display page

606, a portfolio page 608 and an FxAlert page 610 (for precious metal prices) linked together by actions 612.

With reference to FIG. 6B, to add a new service or user capability, for example, the ability of obtaining the latest news for a particular stock, a new template, defining a new page 614 called "Equity News," can be composed for accessing such latest new stock information. New page/template 614 can be linked to and thus only accessible from quote display page 606, assuming new page 614 should be accessible only after a particular stock quote is displayed on quote display page 606. To effect such a link, an action 616 can be added to quote display page (template) 606. For example, the added action 616 can define a branch key N, which when pressed, causes a branch from quote display page 606 to Equity News page 614 in accordance with the above assumption.

C.1. Server Transaction Database

As described above in connection with FIG. 3, server 114 accesses server transaction database 330 to manage transactions with numerous client devices 108. FIG. 7A is an illustration of an exemplary transaction table 700 stored in server transaction database 330. Exemplary table 700 includes a client identification column 702, a template identifier column 703, an optional template title column 704, a template version column 706, an index column 708, a date column 710, a time column 712, and a parameters column 714. Each row of client identification column 702 includes a unique identifier of a client device 108 (e.g., MAN, ESN, MIN). Each row of template identifier column 703 includes a unique identifier of a template (e.g., $temp_1$, $temp_2$, $temp_3$). Each row of template version column 706 specifies the version of the template in the corresponding row of column 703. Accordingly, entries in template version column 706 specify the version of a template (i.e., identified in column 703) that a specific client (i.e., identified in column 702) currently has stored in its client template database 310. Each row of index column 708 identifies the data type that is used to populate the

corresponding template in column 703. The data included in parameters column 714 is the data that was sent to the corresponding client (in column 702) the last time server 114 provided that client with the data type of column 708. Each row of date column 710 and time column 712 specifies when server 114 last provided the client device of column 702 with the data included in parameters column 714.

C.2. Server Template Database

As described above in connection with FIG. 3, server 114 accesses server template database 330 to maintain configuration control over client devices 108. FIG. 7B is an illustration of an exemplary table 750 stored in server template database 330. Table 750 includes a column 754 listing the identifiers of current templates stored in database 330, a column 756 listing template version numbers for the identified templates, and a column 758 listing the definitions of the identified templates. Each row 760 corresponds to an identified template, for example, template $temp_1$. In another embodiment, where each template includes a version identifier (see FIG. 4A, header 400 of template 314), version column 756 is deleted since a template version can be determined from the template header (e.g., header 400) included in the template definition.

C.3. Client Transaction Database

FIG. 8 is an illustration of an exemplary table 800 stored in client transaction database 312 of client device 108. Table 800 is essentially the same as server transaction table 700 of FIG. 7A and discussed above, except that table 800 does not include a client identifier column (e.g., column 702). This is because client transaction database 312, and thus table 800, are specific to only one client device 108.

D.1. Information Request and Response Messages

FIG. 9A is an illustration of an exemplary information request message 900 (corresponding to information request message 316 of FIG. 3) transmitted by client device 108. The information request message (e.g., 900) is also referred to as a client request, since it is initiated by client device 108. The fields of message 900 are arranged in accordance with an exemplary message format, and it is to be understood that message 900 can be arranged in other formats. Message 900 includes a client device identifier (such as a MAN) 902, transaction information 904 used by client device 108 and server 114 to track the current transaction, a template identifier or name 906, a template version identifier 908 identifying the version of the named template stored in template database 310, and a specific information request 910.

In one embodiment, transaction information 904 includes a transaction number 912 and a client state 914. Client 108 tracks each request using transaction number 912, which only client 108 can increment. Client state number 914 specifies the last successfully received update for the template identified by template identifier 906. In one embodiment, client 108 can store transaction number 912 and client state number 914 in, and retrieve transaction number 912 and client state number 914 from, additional columns (not shown) of server transaction database table 700. Use of transaction number 912 and client state number 914 are discussed below.

Client device 108 increments transaction number 912 every time it sends a client request to server 114. Only client device 108 can increment transaction number 912. However, client device 108 never increments client state number 914. Rather, server 114 increments client state number 914 when it sends a server response to client device 108.

If client device 108 issues multiple client requests (e.g., multiple requests for stock quotes AAPL, MSFT, GE, INTC, etc.), each request (e.g., 900) includes a transaction number 914. Server 114 responds to each request individually and

echoes back the appropriate transaction number 914 in each server response (e.g., 920). Each server response received by client device 108 is stored in client transaction database 310. Additionally, in one embodiment, a display page associated with the server response to the last (i.e., in time) client request is displayed to the user.

Client state 914 is used by server 114 to determine the last successfully received (by client device 108) server response to a particular client request. This is important because client device 108 may fail to receive a server response sent by server 114. Thus, server 114 should save the last sent server response in, for example, a suspense file. Only when sever 114 receives a new client request (i.e., for the same information) with the same state number does it write the data of the last server response (which was stored in the suspense file) to server transaction database 332. For example, server 114 may receive a "state 6" client request and return a new "state 7" server response to client device 108. If client device 108 never receives the server response with "state 7", then the next time client device 108 makes the same client request it will again be a "state 6" client request. In this manner, server 114 will know that client device 108 never received the "state 7" server response. This enables server 114 to use old "state 6" data (rather than the data last sent to client device 108, that is associated with "state 7") when performing a comparison of old data to new data to thereby produce a server response.

In one embodiment, either client device 108 or server 114 can reset client state 914 to zero when a server response includes a full update (as opposed to a server response that only includes changes).

FIG. 9B is an illustration of an exemplary information response message 920 (corresponding to information response message 318) transmitted by server 114. The information response message (e.g., 920) is also referred to as a server response, since it is initiated by server 114. Message 920 (also referred to as server response 920) includes requested information 922, provided in response to specific information request 910 of information request message 900.

E.1. Client Requests Information and Issues a Get_template Command

Exemplary methods of requesting and responding to information requests are now described. FIG. 10 represents a series of method steps 1000 performed by client device 108 in response to a request for information from a user. The method begins at a step 1002 when the user of client device 108 issues a request for information from a displayed page, via user interface 308. This request can be thought of as a "display information" request, and is associated with a stored template 314.

At a next step 1004, client device 108 queries client template database 310 to determine whether an appropriate template 314 associated with the request is locally available. If client device 108 determines that the appropriate template is not locally available (i.e., if the answer to step 1004 is NO), then, at a step 1005, client device 108 sends a get_template command to server 114. This can occur, for example, if client device 108 was initially configured with a single template, such as a home template (e.g., $temp_{home}$) associated with a home page, and no other templates have since been supplied to the client device. In such a situation, the home page can allow branch actions to other named templates not resident in client template database 310. Thus, at step 1004, client device 108 detects an absence of one of these other named templates from template database 310 when the user initiates a branch action to the missing template. In turn, client device 108 sends the get_template command. Further method steps related to the get_template command are discussed below in connection with FIGs. 10A and 11.

If the appropriate template is locally available, then at a step 1006, the appropriate template is retrieved from client template database 310. At a next step 1008, there is a determination whether data associated with the appropriate template is available from client transaction database 312. If the answer to step 1008 is YES, then flow continues to a step 1010, where the template is populated with data from client transaction database 312. The data retrieved from client

transaction database 312 is the data last received from server 114 to populate the retrieved template (e.g., data from an earlier transaction). If the answer to step 1008 is NO, then flow jumps directly to a step 1016, which is discussed below.

In one embodiment, after step 1010, in a step 1012, the populated template is displayed (i.e., an associated page) on display 210 of client device 108. Preferably a status (e.g., date and time) of the displayed information is also displayed. Accordingly, the appropriate template preferably includes a status field that can be populated with status data (e.g., date and time). The information displayed to the user can be stale, for example, the data can be days, hours, or seconds old, depending on when client 108 last received the information to populate the appropriate template.

If the user directs client device 108 to do something other than refresh the information (i.e., if the answer to step 1014 is NO), then client device 108 functions accordingly. For example, the user may initiate a branch action that causes client device 108 to display a different page.

At a decision step 1014, if the user requests that the information (i.e., that populates the template) be refreshed with "new" information (i.e., if the answer to step 1014 is YES), client device 108 composes and transmits an appropriate information request message to server 114, at a step 1016. In one embodiment, a user can request refreshed information by pressing a predefined action key, such as the "enter" key or "space bar" key. An example request message 900 is described above in connection with FIG. 9A.

In an alternative embodiment, flow jumps directly from step 1008 to step 1016, such that client device 108 sends a request message to server 114 after client device 108 retrieves data from client transaction database 312. In another embodiment, flow jumps directly from step 1006 to step 1016, such that client device 108 sends a request message to server 114 after client 204 retrieves the appropriate template from client template database 310.

E.2. Server Responds to an Information Request and Provides a Template Update

FIG. 11 represents a series of method steps 1100 performed by server 114 in response to a request for information from client device 108. The process begins at a step 1102 when server 114 receives a request message (e.g., request 900) sent from client device 108. At a step 1104, server 114 identifies client device 108. This is accomplished using a unique identifier (e.g. 902) included in the request. In this example, server 114 recognizes that the client device 108 that sent the request message has a template for displaying the requested information, because the request (e.g., 900) includes a template identifier (e.g., 906). At this point, server 114 can also determine whether the specific information request is authorized for the requesting MAN.

At a next step 1106, server 114 retrieves the latest (i.e., most current or up-to-date) version of the identified template (e.g., the template identified by template identifier 906) from server template database 330. At a step 1108, server 114 retrieves/derives the requested information required to populate the data fields of the template that was retrieved at step 1106. For example, at step 1108, server 114 retrieves the requested information from information store 334 in accordance with the most current template definition.

In a step 1110, server 114 determines whether client 108 has the most current template. To make this determination, server 114 compares template version identifier 906 of the template named in information request message 900 against the version identifier for the same named template just retrieved from server template database 330 (e.g., in column 756 of table 750 of FIG. 7B) at step 1106.

If server 114 determines that the identified client device 108 does not have the latest version of the appropriate template (i.e., the answer to step 1110 is NO), then client device 108 has an "old" template that requires updating with a "new" template, namely, the template just retrieved from server template database 330.

Accordingly, at a step 1112, server 114 composes an information response message (e.g., message 930) including:

a) information retrieved from information store 334 at step 1108; and

b) template update information from the "new" template.

In one embodiment, server 114 includes the entire "new" template in the information response message. In another embodiment, server 114 compares the "old" template to the "new" template to determine changes between the two templates. Server 114 then includes only these changes in the response message, to thereby shorten the response message and reduce required transmission bandwidth when the response message is transmitted. In a further embodiment, particularly if the "new" template includes a large amount of information, server 114 partitions the "new" template into a series of consecutive but separate messages.

On the other hand, if server 114 determines at step 1110 that client device 108 does not require a template update (i.e., the answer to step 1110 is YES), then server 114 composes an information response message using only the information retrieved from information store 334 (e.g., message 920), since a template update is unnecessary. At a next step 1116, server 114 transmits the composed information response message to client 108. For example, server 114 transmits response message 920 or 930 composed respectively at steps 1114 or 1112.

In one embodiment, the message that server 114 composes at step 1114 or 1112 (and sends at step 1116) includes all the data necessary to populate a template.

In another embodiment, the message that server 114 composes at step 1114 (and sends at step 1116) includes the information that has changed since client device 108 last successfully received a server response (i.e., to populate the particular template) from server 114, but does not include the information that has not changed since server 114 last sent a successfully received server response

message. Accordingly, an advantage of this embodiment is that the size of the response message (or messages) is further reduced.

An advantage of the present invention is that if the client device 108 (to which the response message is being sent) has the most current template, then the composed and transmitted response message (e.g., message 920 composed at step 1114) only includes the information required to populate and thus refresh a template. This significantly reduces the size of the response message (or messages) that is transmitted from server 114 to client device 108. Minimizing the size of response messages reduces the cost and/or response time (also referred to as latency) for providing information services. For example, where a communications system provider charges on a volume basis, the less data transmitted means less cost to the user. Additionally, since latency is typically proportional to the amount of data being transmitted, the less data transmitted means lower latency. A further advantage is the reduction in a system transmission bandwidth, such that more users can be supported by the services of the system.

Further details of step 1114, according to an embodiment of the present invention, are now discussed with reference to FIG. 12. In a step 1202, server 114 queries server transaction database 332 to determine the information, for the particular template, that client device 108 has stored in client transaction database 312. For example, server 114 searches table 700, of FIG. 7A, based on client identifier 902 and template identifier 906 to determine what information was last successfully received by client device 108 for the identified template.

In a step 1204, server 114 then compares the information in each data field (i.e., the information retrieved in step 1108 of FIG. 11) against the record of what was last sent to client device 108 (i.e., determined in step 1202), to thereby determine the information that has changed (also referred to as the changed fields).

Steps 1202 and 1204 can be illustrated with reference to FIG. 13. An "old" page 1302 represents the information (populating a precious metals template) that client device 108 has stored in client transaction database 312 (i.e.,

at step 1202). Server 114 determines that client device 108 has such an old page of information using server transaction database 332. A "new" page 1304 represents up-to-date or current information (populating the same precious metals template) retrieved by server 114 at step 1108. A change definition 1306 represents a change in information between old page 1302 and new page 1304. Server 114 determines change definition 1306 by comparing the information in old page 1302 to the information in new page 1304. Server 114 can compress change definition 1306 using a data compression technique to produce a compressed change definition 1308, thereby further reducing the size of the response message.

In one embodiment, at step 1202, server 114 queries server transaction database 332, based also on client state number 912 (i.e, in addition to client identifier 902 and template identifier 906) to ensure that server 114 actually compares the up-to-date information (i.e., the information retrieved in step 1108) against what client device 108 actually has stored in its client transaction database 312. If this query is not based also on client state number 912, there is a possibility that server 114 will perform the comparison using information that was last sent to client device 108, but never received by client device 108.

E.3. Client Receives an Information Response and a Template Update

FIG. 10A represents a series of method steps 1050 performed by client device 108 when the client receives a response message from server 114. The process begins at a step 1052 when client device 108 receives a response message (e.g., message 920 or 930) from server 114 (see FIG. 11, step 1116).

At a decision step 1054, client device 108 determines whether the response message includes a template update. If the response message includes a template update for an identified template, at a step 1056, client device 108 updates the identified template in client template database 310 using template update information from the response message. Then flow proceeds to a step 1058.

On the other hand, if the response message does not include a template update, then flow proceeds directly from decision step 1054 to step 1058. At step 1058, client device 108 updates client transaction database 312 with information from the response message. For example, client device 108 replaces a row of client transaction table 800 containing "old" information with "new" information received from the response message.

At a next step 1060, client device 108 refreshes the current display page, if appropriate, by retrieving the "new" information from client transaction database 312. If a template update was received, and it is appropriate to update the current display page, then the current display page is updated to reflect a designated display arrangement, information fields, actions and refreshed data associated with the "new" or updated template.

E.4. Server Receives an Information Request Including a Get_template Command From the Client

FIG. 11A represents an exemplary series of method steps 1150 performed by server 114 when the server receives a get_template command from client device 108 (see FIG. 10, step 1005). The process begins at a step 1152 when server 114 receives an information request message from client device 108.

At a decision step 1154, server 114 determines whether the request message includes the get_template command. The get_template command includes a template identifier identifying a template required by the requesting client device 108. If the request message does not include a get_template command, flow control branches to step 1158, described below, and the method continues from step 1158.

On the other hand, if the request message includes a get_template command, then at a step 1156, server 114 validates the requested template. To validate the requested template, server 114 queries server template database 330 using the requested template identifier in the get_template command to determine

whether the requesting client device 108 is an authorized user of the requested template and its associated services. If the requesting client device 108 is not an authorized user of the requested template, server 114 transmits an error message to the requesting client, and the process terminates. Otherwise, server 114 retrieves the requested template from server template database 330.

At next step 1158, server 114 collects data in accordance with the retrieved template, as described above in connection with step 1108 of FIG. 11. At a next step 1160, server 114 composes an information response message including a template update, as described above in connection with step 1112 of FIG. 11. In this case, the template update includes the retrieved template in its entirety. At a next step 1162, server 114 transmits the information response/template update, as described above in connection with step 1116 of FIG. 11. When client device 108 receives the information response message, client device 108 executes the method steps described above in connection with FIG. 10A.

In another embodiment for updating templates, client device 108 sends a get_template command to server 114, but no template definitions, such as variable (field) definitions, etc, are associated with the get_template command. This get_template command is not considered a request for any information other than an absent template. Server 114 determines whether this get_template command or a client request for information has been received. If a client request for information is received, then server 114 executes method steps 1104 - 1116, as described above connection with FIG. 11. On the other hand, if a get_template command is received, server 114 returns only the requested template, if authorized, to client device 108 without collecting data service information. In other words, in this embodiment, both of the above described steps 1158 and 1160 are omitted.

The above described embodiments "automatically" update templates in client device 108 because the updates occur without requiring any predetermined, update-specific actions from the user. The user need only submit information

requests in the normal course of client device operation, such as from a system services display page, and in response, the system of the present invention automatically effects the necessary template update. As described above, such a template update correspondingly updates options, features, and/or services available to the client device and the user thereof. The update of the options, features, and/or services available to the client device corresponds to a reconfiguration of the client device.

F.1. Hardware and Software Implementations

Server 114 can perform specific features of the present invention using server controllers, which in effect comprise a computer system. Although communication-specific hardware can be used to implement the present invention, the following description of a general purpose computer system is provided for completeness. The present invention is preferably implemented in software. Alternatively, the invention may be implemented using hardware or a combination of hardware and software. Consequently, the invention may be implemented in a computer system or other processing system. An example of such a computer system 1400 is shown in FIG. 14. In the present invention, for example, client and server applications 304 and 306 each executes on distinct computer systems 1400. The computer system 1400 includes one or more processors, such as processor 1404. The processor 1404 is connected to a communication infrastructure 1406 (for example, a bus or network). Various software implementations are described in terms of this exemplary computer system. After reading this description, it will become apparent to a person skilled in the relevant art how to implement the invention using other computer systems and/or computer architectures.

Computer system 1400 also includes a main memory 1408, preferably random access memory (RAM), and may also include a secondary memory 1410. The secondary memory 1410 may include, for example, a hard disk drive 1412 and/or a removable storage drive 1414, representing a floppy disk drive, a

magnetic tape drive, an optical disk drive, etc. The removable storage drive 1414 reads from and/or writes to a removable storage unit 1418 in a well known manner. Removable storage unit 1418, represents a floppy disk, magnetic tape, optical disk, etc. which is read by and written to by removable storage drive 1414. As will be appreciated, the removable storage unit 1418 includes a computer usable storage medium having stored therein computer software and/or data.

In alternative implementations, secondary memory 1410 may include other similar means for allowing computer programs or other instructions to be loaded into computer system 1400. Such means may include, for example, a removable storage unit 1422 and an interface 1420. Examples of such means may include a program cartridge and cartridge interface (such as that found in video game devices), a removable memory chip (such as an EPROM, or PROM) and associated socket, and other removable storage units 1422 and interfaces 1420 which allow software and data to be transferred from the removable storage unit 1422 to computer system 1400.

Computer system 1400 may also include a communications interface 1424. Communications interface 1424 allows software and data to be transferred between computer system 1400 and external devices. Examples of communications interface 1424 may include a modem, a network interface (such as an Ethernet card), a communications port, a PCMCIA slot and card, etc. Software and data transferred via communications interface 1424 are in the form of signals 1428 which may be electronic, electromagnetic, optical or other signals capable of being received by communications interface 1424. These signals 1428 are provided to communications interface 1424 via a communications path 1426. Communications path 1426 carries signals 1428 and may be implemented using wire or cable, fiber optics, a phone line, a cellular phone link, an RF link and other communications channels.

In this document, the terms "computer program medium" and "computer [illegible] refer to media such as removable storage

computer program products are means for providing software to computer system 1400.

Computer programs (also called computer control logic) are stored in main memory 1408 and/or secondary memory 1410. Computer programs may also be received via communications interface 1424. Such computer programs, when executed, enable the computer system 1400 to implement the present invention as discussed herein. In particular, the computer programs, when executed, enable the processor 1404 to implement the process of the present invention. Accordingly, such computer programs represent controllers of the computer system 1400. By way of example, in a preferred embodiment of the invention, the processes performed by server 114 and server application 306, and by client device 108 and client application 304, can be performed by computer control logic (e.g., called "controllers"). Also, client and server template databases 310 and 330, and client and server transaction databases 312 and 332 are stored in respective memories 1408 and/or respective memories 1410. Where the invention is implemented using software, the software may be stored in a computer program product and loaded into computer system 1400 using removable storage drive 1414, hard drive 1412 or communications interface 1424.

In another embodiment, features of the invention are implemented primarily in hardware using, for example, hardware components such as application specific integrated circuits (ASICs). Implementation of the hardware state machine so as to perform the functions described herein will be apparent to persons skilled in the relevant art(s).

V. Conclusion

While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example, and not limitation. It will be apparent to persons skilled in the relevant art that

various changes in form and detail can be made therein without departing from the spirit and scope of the invention.

The present invention has been described above with the aid of functional building blocks illustrating the performance of specified functions and relationships thereof. The boundaries of these functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternate boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Any such alternate boundaries are thus within the scope and spirit of the claimed invention. One skilled in the art will recognize that these functional building blocks can be implemented by discrete components, application specific integrated circuits, processors executing appropriate software and the like or any combination thereof. Thus, the breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

All cited patent documents and publications in the above description are incorporated herein by reference.

What Is Claimed Is:

1. In a client-server system including one or more client devices each associated with a unique client identifier and having a client template database for storing one or more templates defining a configuration of the client device, and a server having a server template database, a method of automatically reconfiguring the client device, comprising the steps of:

a. receiving a client request including a template identifier from a client device;

b. retrieving a template corresponding to said template identifier from the server template database;

c. determining whether the client device requires a template update using said template identifier and said retrieved template; and

d. sending a server response including template update information when the client device requires said template update as determined at step c.

2. The method of claim 1, wherein said template identifier identifies a client template in the client template database and said client request includes a client template version identifier, and wherein step c. further comprises the step of:

comparing said client template version identifier to a template version identifier associated with said retrieved template, thereby determining whether said client template is an old version requiring said template update.

3. The method of claim 1, wherein said retrieved template and said client template each include at least one template definition for configuring the client device, and wherein step c. further includes the step of:

sending a server response to the client device including a template definition of said retrieved template when the client device requires said template update.

4. The method of claim 1, wherein said retrieved template includes one or more data fields, the method further comprising the steps of:

collecting service related information relating to said one or more data fields; and

composing said server response to said request based on said service related information.

5. The method of claim 1, wherein step c. comprises the steps of:

detecting a predetermined command in said client request indicating an absence of a template corresponding to said template identifier at the client device; and

sending said retrieved template to said client device when said predetermined command is detected.

6. The method of claim 1, wherein said retrieved template is used to reconfigure the client device.

7. In a client-server system including one or more client devices each associated with a unique client identifier and having a client template database for storing one or more templates defining a configuration of the client device, the system including a server having a server template database, a method of automatically reconfiguring a client device, comprising the steps of:

a. sending a client request from the client device to the server;

b. receiving a server response from the server, said server response including a template identifier;

c. determining whether said server response includes template update information; and

d. updating a template corresponding to said template identifier in the template database with said template update information when said server response includes said template update information as determined at step c.

8. The method of claim 7, wherein step a. comprises the step of:

including a command in said client request indicating an absence of a template corresponding to said template identifier.

9. The method of claim 8, wherein the client device includes a user interface adapted to receive user requests, the method further comprising the step of:

detecting said absence of said template in response to a user request requiring said absent template.

10. The method of claim 7, wherein the client device includes a display, said template update information including one or more new template definitions defining one or more data fields and an arrangement of said one or more data fields, said server response including requested information relating to said one or more data fields, the method further comprising the step of:

displaying said requested information on a page in accordance with said one or more new template definitions.

11. The method of claim 7, wherein the client device includes a display, said template update information including one or more new template definitions defining one or more user actions selectable by the user from an associated display page, the method further comprising the steps of:

displaying said display page; and

providing user selectable actions from said display page in accordance with said one or more new template definitions.

12. The method of claim 7, further comprising the step of:

including a template version identifier in said client request, said template version identifier identifying a version of a template stored in said template database.

13. The method of claim 7, further comprising the step of reconfiguring the client device with said template update information.

14. A client apparatus for communicating with a server via a communications system, the client apparatus comprising:

a client template database for storing templates defining a configuration of the client apparatus;

a transmitter that sends a client request to the server;

a receiver that receives a server response from the server, the server response including a template identifier; and

a client controller that determines whether said server response includes template update information, wherein said client controller updates a template, corresponding to said template identifier, in said client template database with said template update information when said server response includes said template update information.

15. The apparatus of claim 14, wherein said client request includes a template identifier and a predetermined command indicating an absence of a required template corresponding to said template identifier.

16. The apparatus of claim 14, further comprising a user interface adapted to receive user requests, and wherein said client controller detects said absence of said required template in response to a user request requiring said absent, required template.

17. The apparatus of claim 14, further comprising a display, said template update information including one or more template definitions defining one or more data fields and an arrangement of said one or more data fields, said server response including requested information associated with said one or more

template definitions, wherein said client controller displays said requested information in accordance with said one or more template definitions.

18. The apparatus of claim 14, further comprising a display, said template update information including one or more template definitions that define one or more user actions that are selectable by a user when presented on a display page, wherein said client controller displays said display page and responds when the user selects said one or more actions in accordance with said one or more template definitions.

19. The apparatus of claim 14, wherein two or more of said templates stored in said client template database define an interconnected hierarchy of user navigable display pages, wherein said display pages permit a user to access data services.

20. The apparatus of claim 14, wherein said template update information reconfigures the client apparatus.

21. A server apparatus for communicating with and reconfiguring a client device via a communications network, comprising:

a server template database for storing templates that define client device configurations;

a receiver that receives a client request from the client device, said client request including a unique client identifier and a template identifier;

a server controller that retrieves a template corresponding to said template identifier from said server template database, determines whether said unique client identifier corresponds to the client device, and if so, determines whether the client device requires a template update based on said template identifier and said retrieved template; and

a transmitter that sends a server response including template update information when said client device requires said template update.

22. The apparatus of claim 21, wherein said template identifier corresponds to a client template stored in the client device, and said client request includes a version identifier corresponding to said client template, wherein said server controller compares said version identifier to a version identifier associated with said retrieved template to determine whether said client template is an old version requiring updating with template update information provided by said retrieved template.

23. The apparatus of claim 21, wherein said retrieved template and said client template each include at least one template definition for configuring the client device, and wherein said server response includes a template definition from said retrieved template when the client device requires said template update.

24. The apparatus of claim 21, wherein said retrieved template includes one or more data fields, and wherein said server controller collects service information related to said one or more data fields, and then composes said server response based on said service information.

25. The apparatus of claim 21, wherein said server controller is adapted to detect a predetermined command in said client request indicating an absence of a template corresponding to said template identifier in the client device, and wherein said server controller sends template update information relating to said retrieved template to the client device when said predetermined command is detected;

26. The apparatus of claim 21, wherein said template update information is used to reconfigures the client device.

27. A communication system for providing data services to a user, comprising:

a client device including a client template database for storing one or more templates used to configure the client device, each said template including one of

a content portion defining one or more data fields and an arrangement of said one or more data fields on a display of said client device, and

an action portion defining one or more actions available to a user when a page associated with the template is displayed; and

a server including a server template database for storing one or more templates, wherein said server sends template update information retrieved from said server template database to said client device when said server determines said client device requires a template update.

28. The apparatus of claim 27, wherein two or more of said templates stored in said client template database define an interconnected hierarchy of user navigable display pages, wherein said display pages permit a user to access data services.

System, Method, and Apparatus for Automatically and Dynamically Updating Options, Features, and/or Services Available to a Client device

Abstract

A system, method, and apparatus for automatically and dynamically updating options, features, and/or services available to a client device operating in a client-server environment. The client device includes a client template database for storing templates defining a configuration of the client device. This configuration determines the options, features, and/or services available to a client device and the user of the client device. A server includes a server template database for storing the most current or latest versions of the templates used to configure the client device. When a user enters a user request at the client device, the client device transmits an associated information request to the server. The information request includes a client template identifier associated with the information request and a client template version identifier. The server receives the information request and compares the client template version identifier to a version identifier for a corresponding template in the server template database, to determine if the client device has the latest version of the template. If it does not, then the server transmits an information response message to the client, including a template update.

A274-30.wpd

DOCKET SEARCH

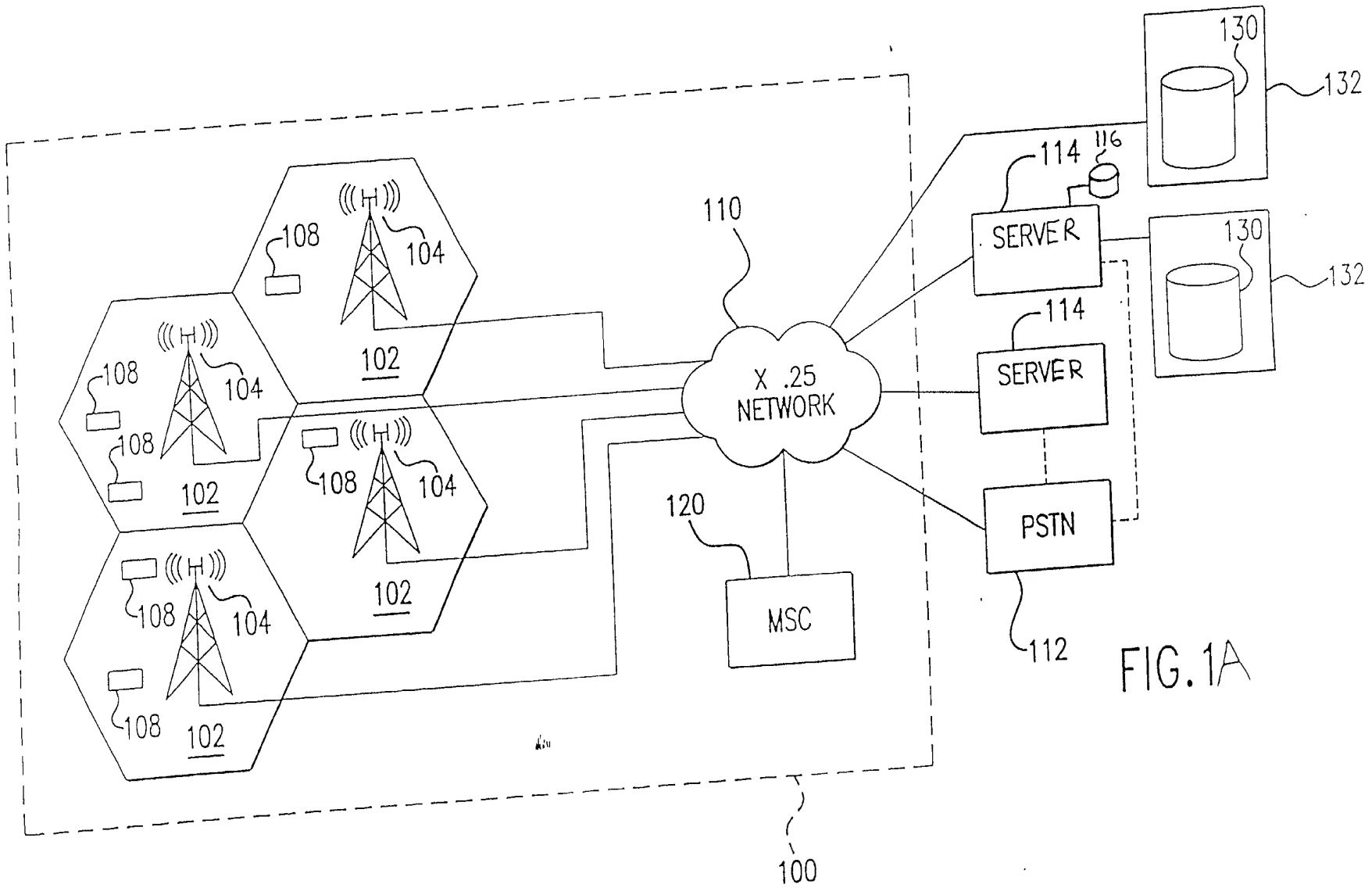


FIG. 1A

09875.0012

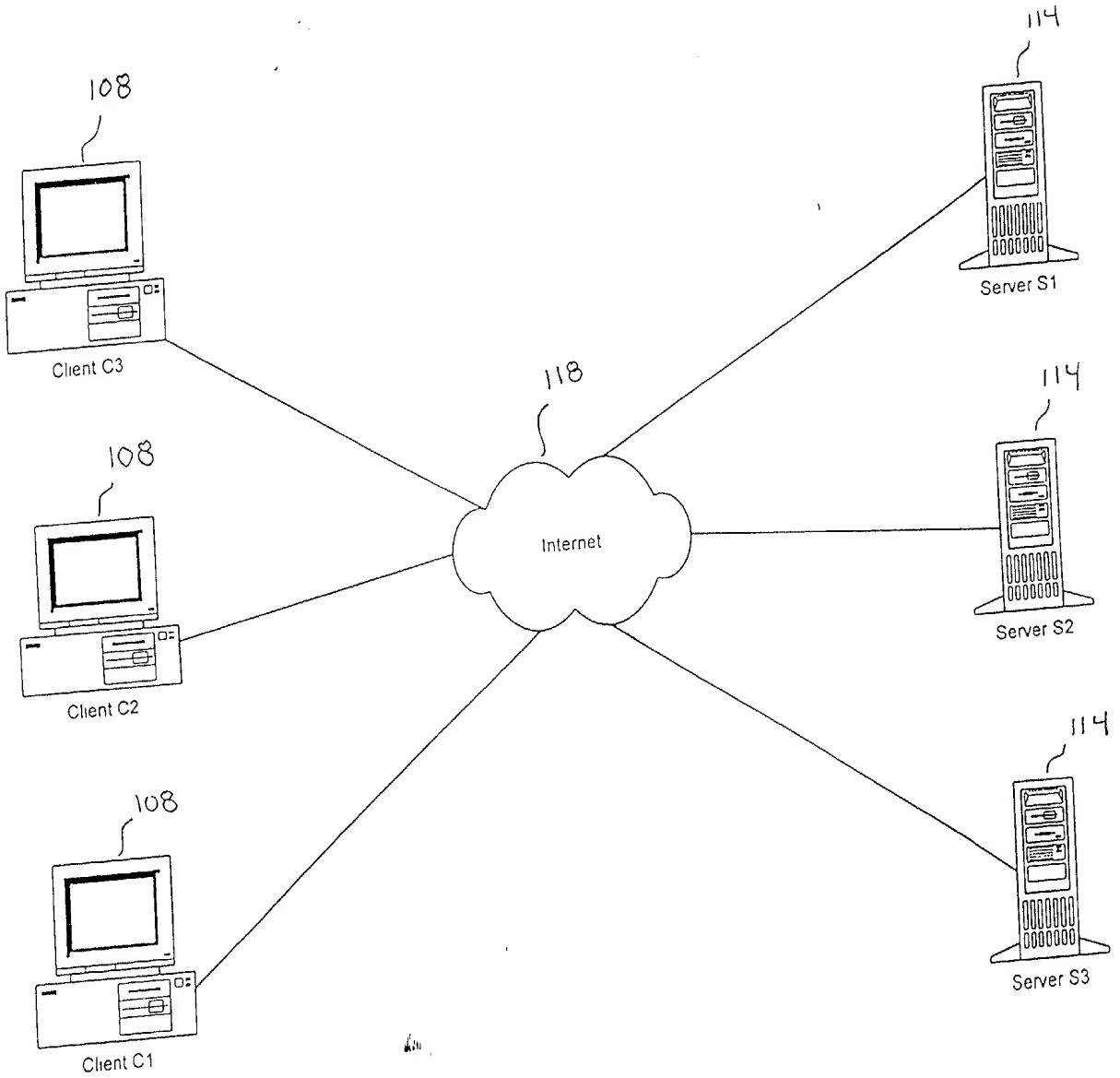


FIG. 1B

1763001v.sc

DOCKET 98E2560

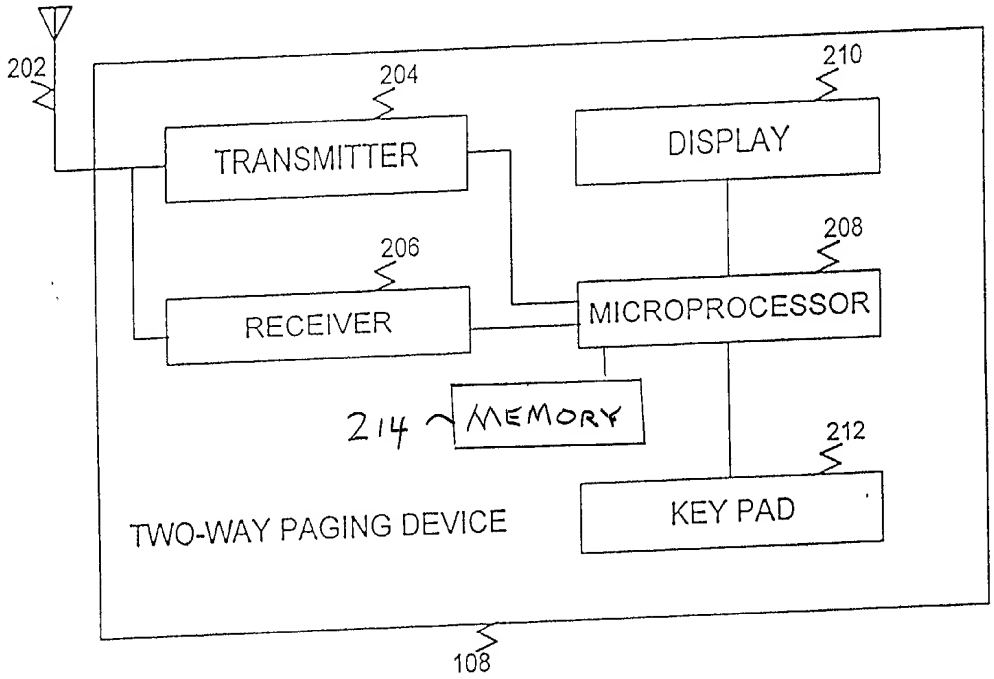


FIG. 2A

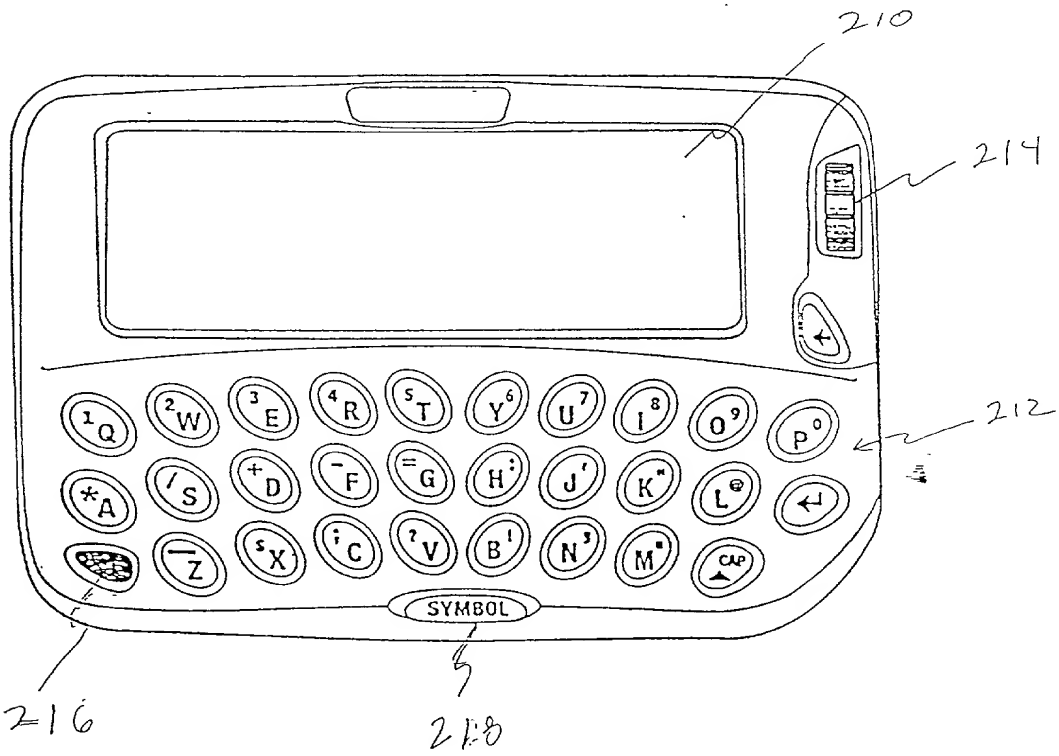


FIG 2B

0001-35.vsd/1

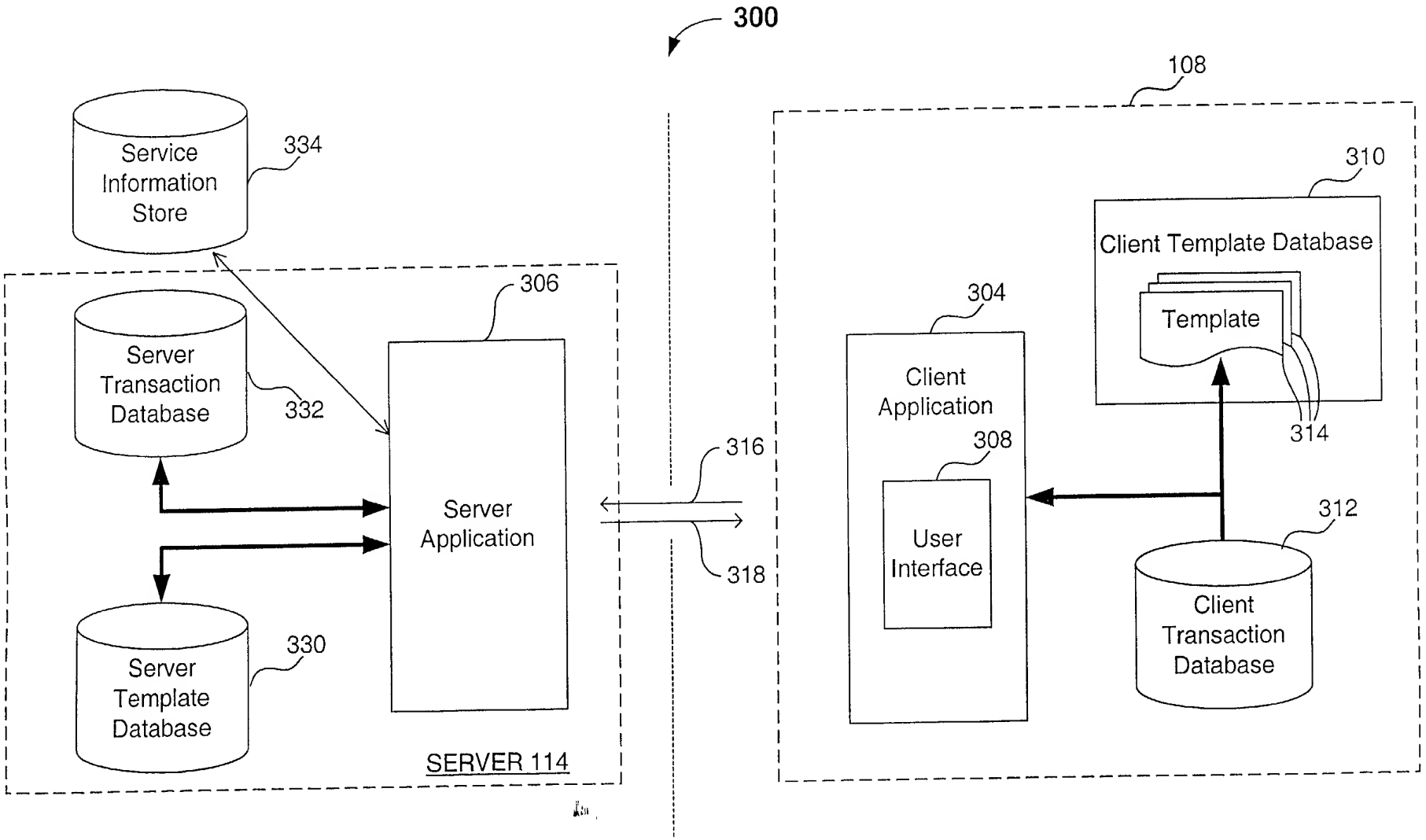


FIG.3

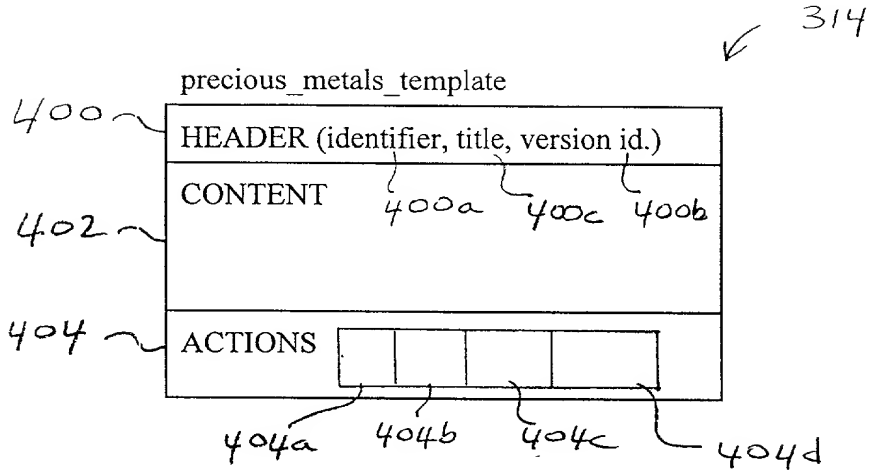

314
precious_metals_template
400
HEADER (identifier, title, version id.)
CONTENT
400a
400c
400b
402
404
ACTIONS
404a
404b
404c
404d

FIG. 4A

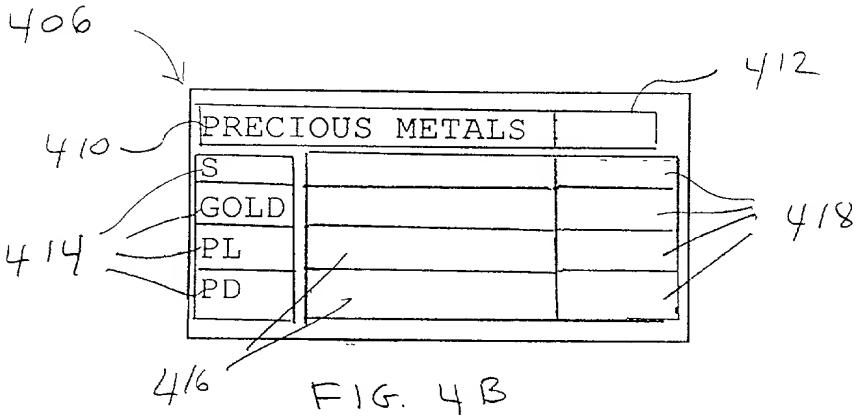

406
412
410
PRECIOUS METALS
S
GOLD
PL
PD
414
418
416

FIG. 4B

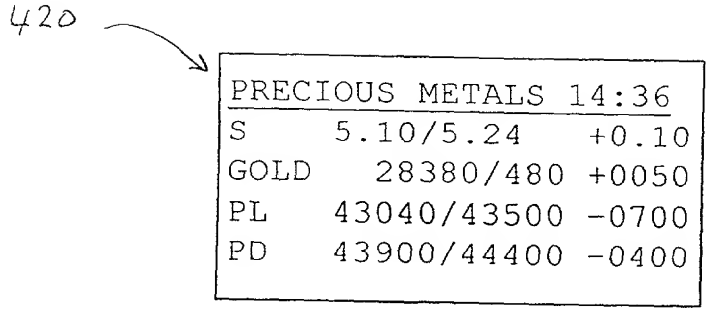
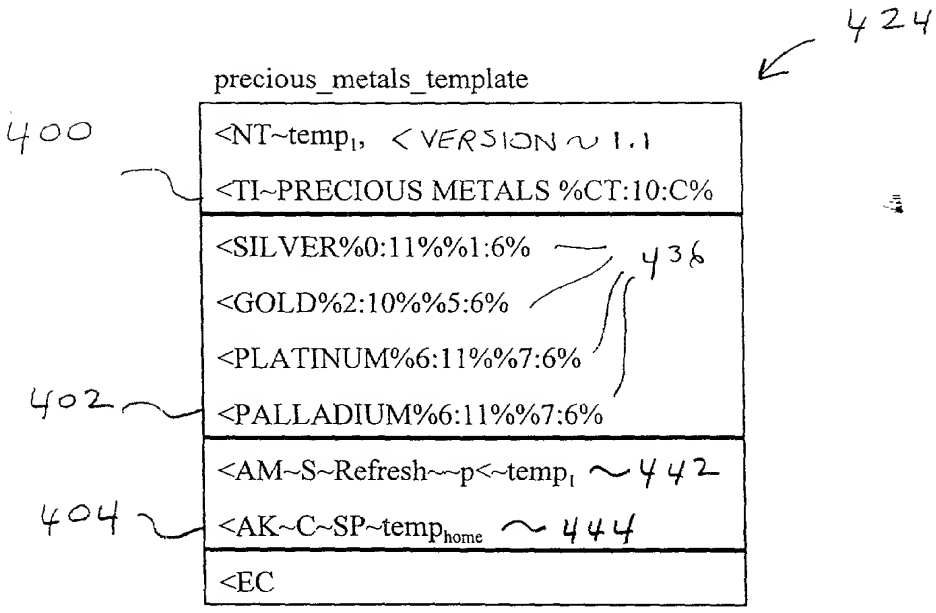

420
PRECIOUS METALS 14:36
S 5.10/5.24 +0.10
GOLD 28380/480 +0050
PL 43040/43500 -0700
PD 43900/44400 -0400

FIG. 4C


424
precious_metals_template
400
<NT~temp1, <VERSION~1.1
<TI~PRECIOUS METALS %CT:10:C%
<SILVER%0:11%%1:6%
<GOLD%2:10%%5:6%
<PLATINUM%6:11%%7:6%
436
402
<PALLADIUM%6:11%%7:6%
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404
<AK~C~SP~temphome ~444
<EC

FIG 4D

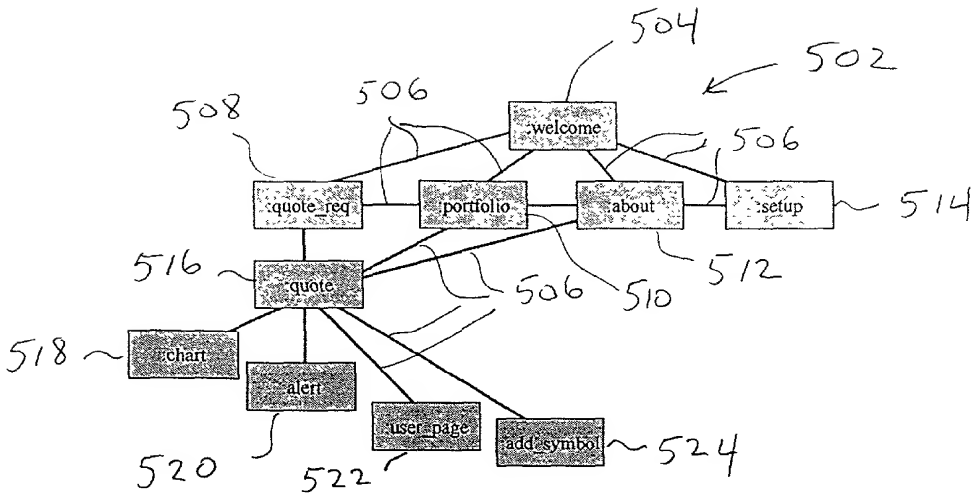


FIG. 5

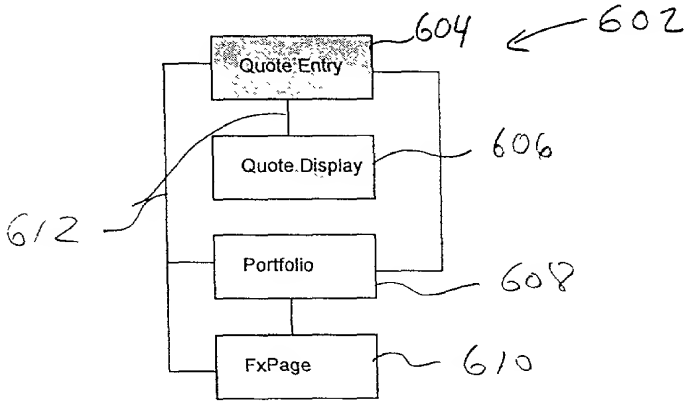


FIG. 6A

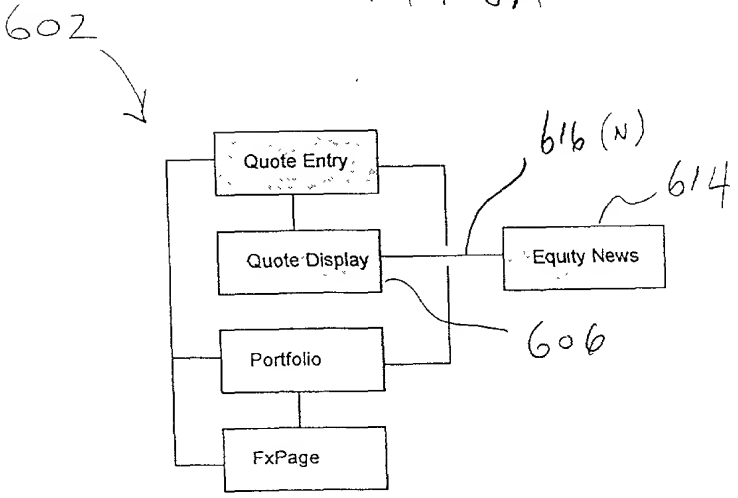
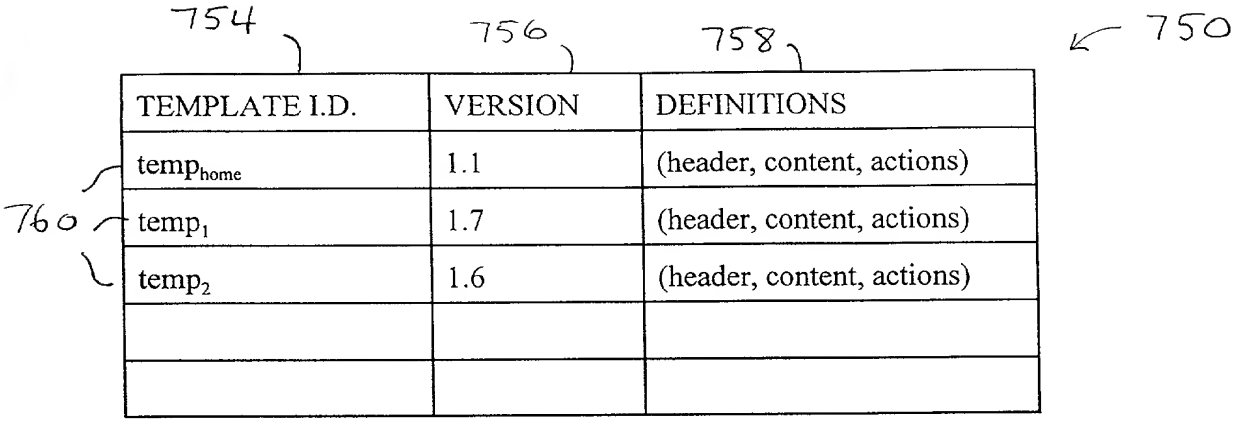


FIG. 6B

SERVER TRANSACTION DATABASE TABLE 700

702 CLIENT	703 TEMPLATE IDENTIFIER	704 TEMPLATE TITLE	706 TEMPLATE VERSION	708 INDEX	710 DATE	712 TIME	714 PARAMETERS
MAN_1	$temp_3$	QUOTE	1.7	AAPL	11.19.1999	10.33.21	$DATA_1$
MAN_1	$temp_3$	QUOTE	1.7	IBM	11.19.1999	10.37.36	$DATA_2$
MAN_1	$temp_8$	SPORTS	1.3	YANKEES	11.20.1999	14.22.17	$DATA_3$
MAN_1	$temp_{12}$	MOVIES	1.4	20009	11.23.1999	17.10.03	$DATA_4$
MAN_1	$temp_6$	+FX	2.2	CAN	12.04.1999	08.35.44	$DATA_5$
MAN_1	$temp_6$	+FX	2.2	YEN	01.03.2000	09.42.53	$DATA_6$
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
MAN_2	.	.	.	.	.	.	.
MAN_2	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
MAN_N	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
	.						

FIG. 7A



TEMPLATE I.D.	VERSION	DEFINITIONS
$temp_{home}$	1.1	(header, content, actions)
$temp_1$	1.7	(header, content, actions)
$temp_2$	1.6	(header, content, actions)

FIG. 7B

CLIENT TRANSACTION DATABASE TABLE 800

803 TEMPLATE IDENTIFIER	804 TEMPLATE TITLE	806 TEMPLATE VERSION	808 INDEX	810 DATE	812 TIME	814 PARAMETERS
$temp_3$	QUOTE	1.7	AAPL	11.19.1999	10.33.21	$DATA_1$
$temp_3$	QUOTE	1.7	IBM	11.19.1999	10.37.36	$DATA_2$
$temp_8$	SPORTS	1.3	YANKEES	11.20.1999	14.22.17	$DATA_3$
$temp_{12}$	MOVIES	1.4	20009	11.23.1999	17.10.03	$DATA_4$
$temp_6$	+FX	2.2	CAN	12.04.1999	08.35.44	$DATA_5$
$temp_6$	+FX	2.2	YEN	01.03.2000	09.42.53	$DATA_6$
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.

FIG. 8

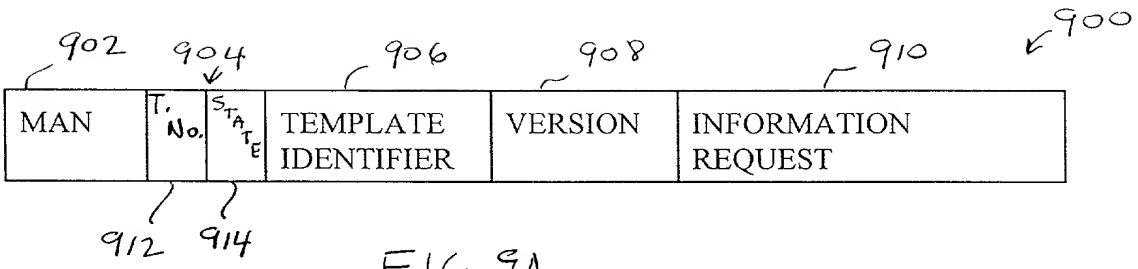


FIG. 9A

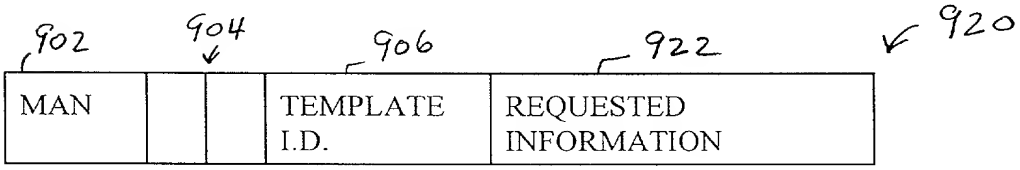


FIG. 9B

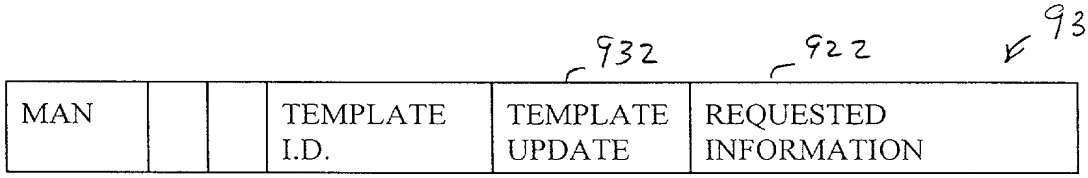


FIG. 9C

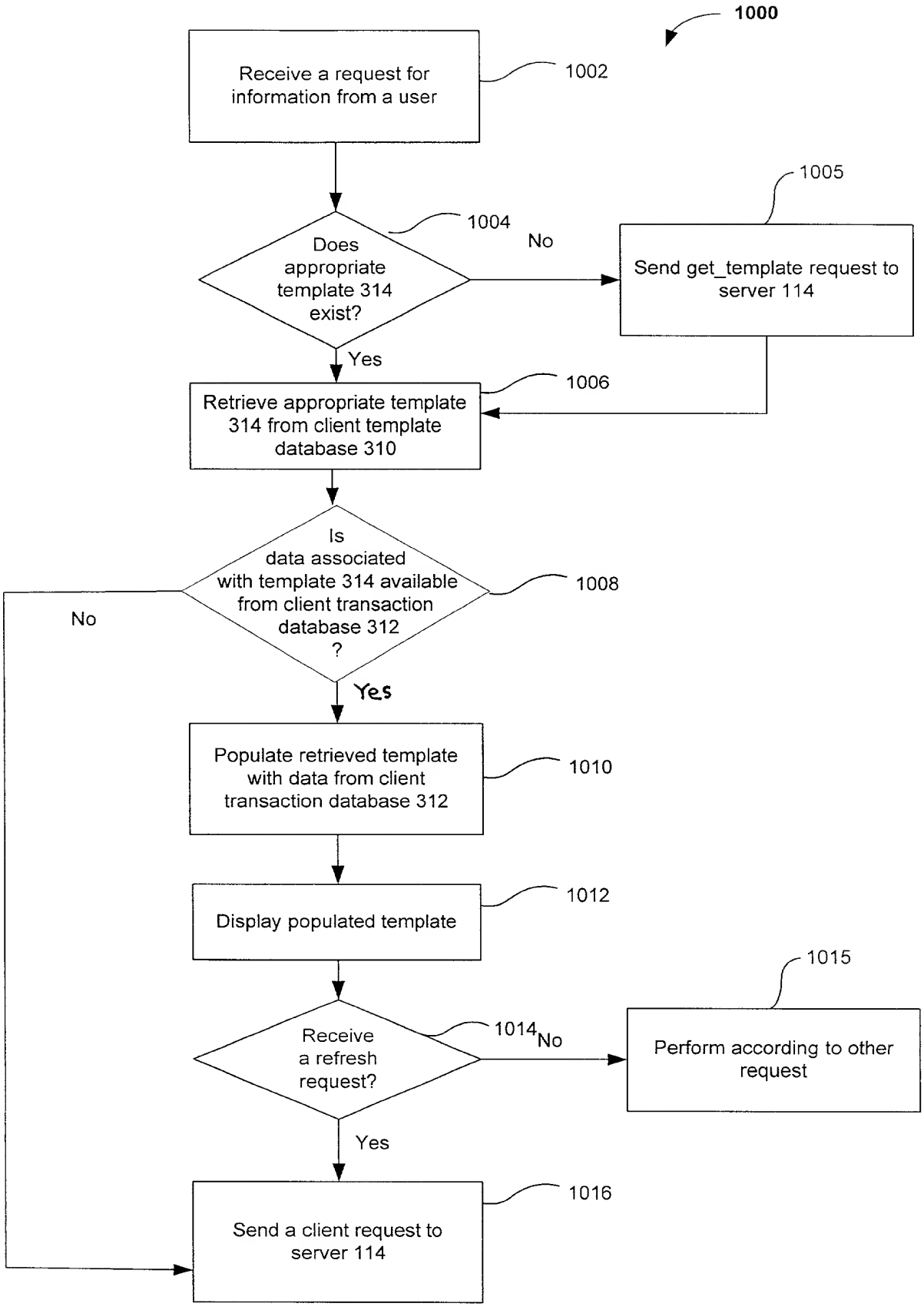


FIG. 10

0001-35 vsd/2

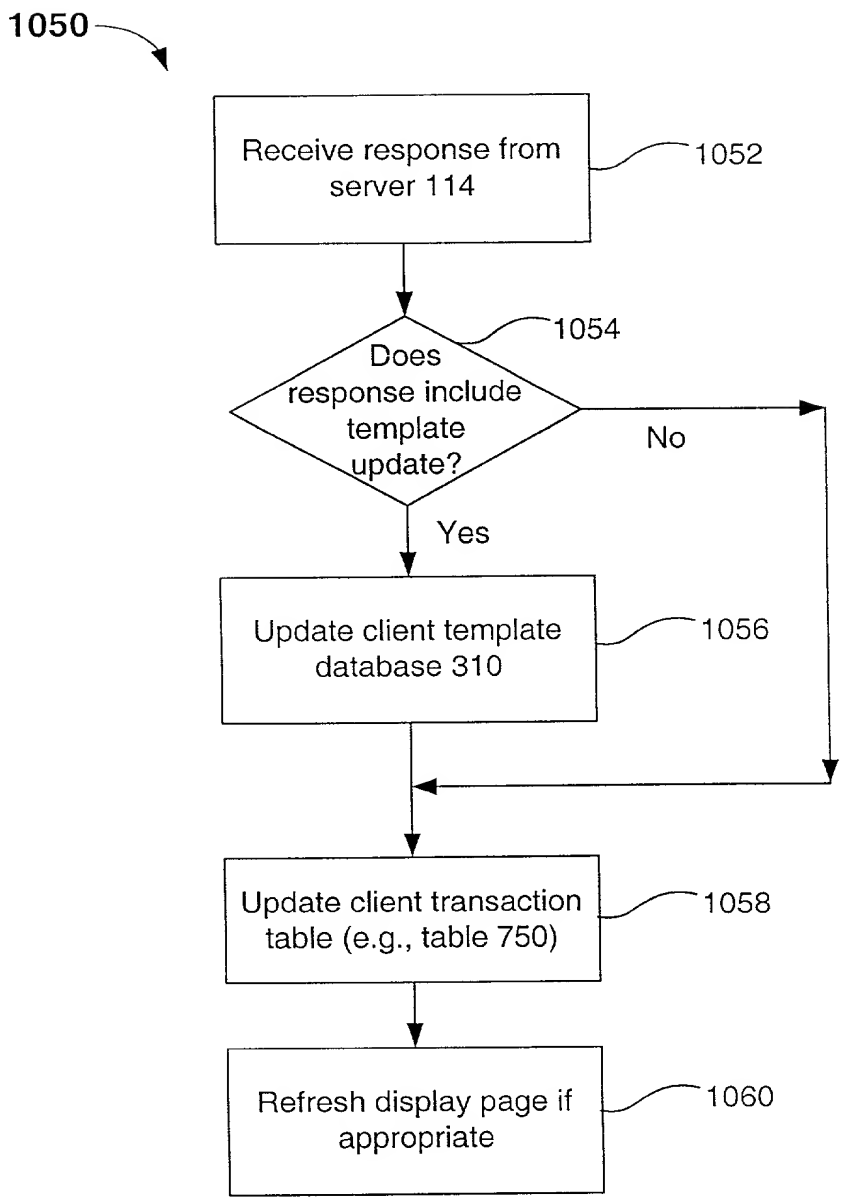


FIG. 10A

Client Ex. 1009 - Page 35 of 74

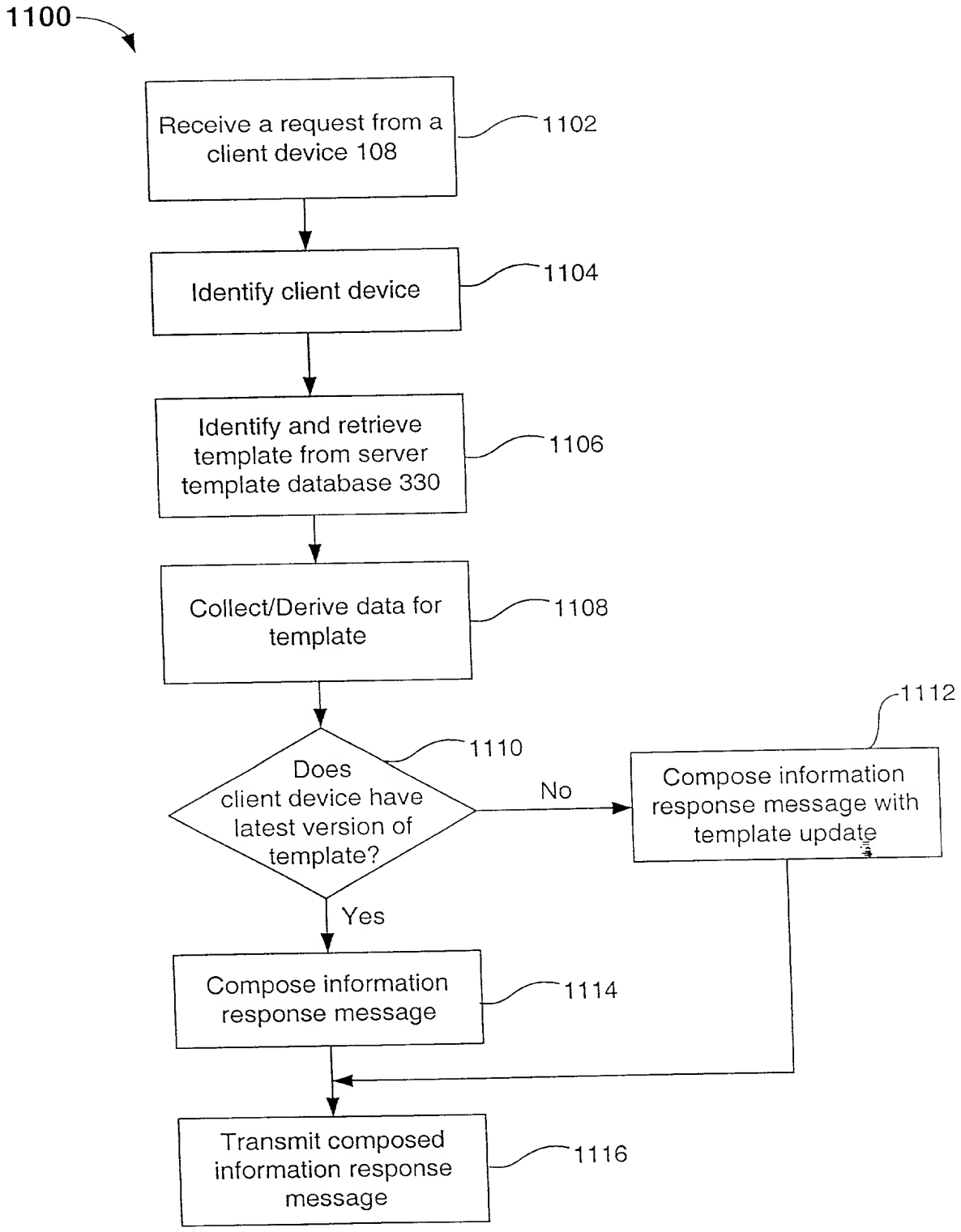

1100
Receive a request from a client device 108
1102
Identify client device
1104
Identify and retrieve template from server template database 330
1106
Collect/Derive data for template
1108
Does client device have latest version of template?
1110
No
Compose information response message with template update
1112
Yes
Compose information response message
1114
Transmit composed information response message
1116

FIG. 11

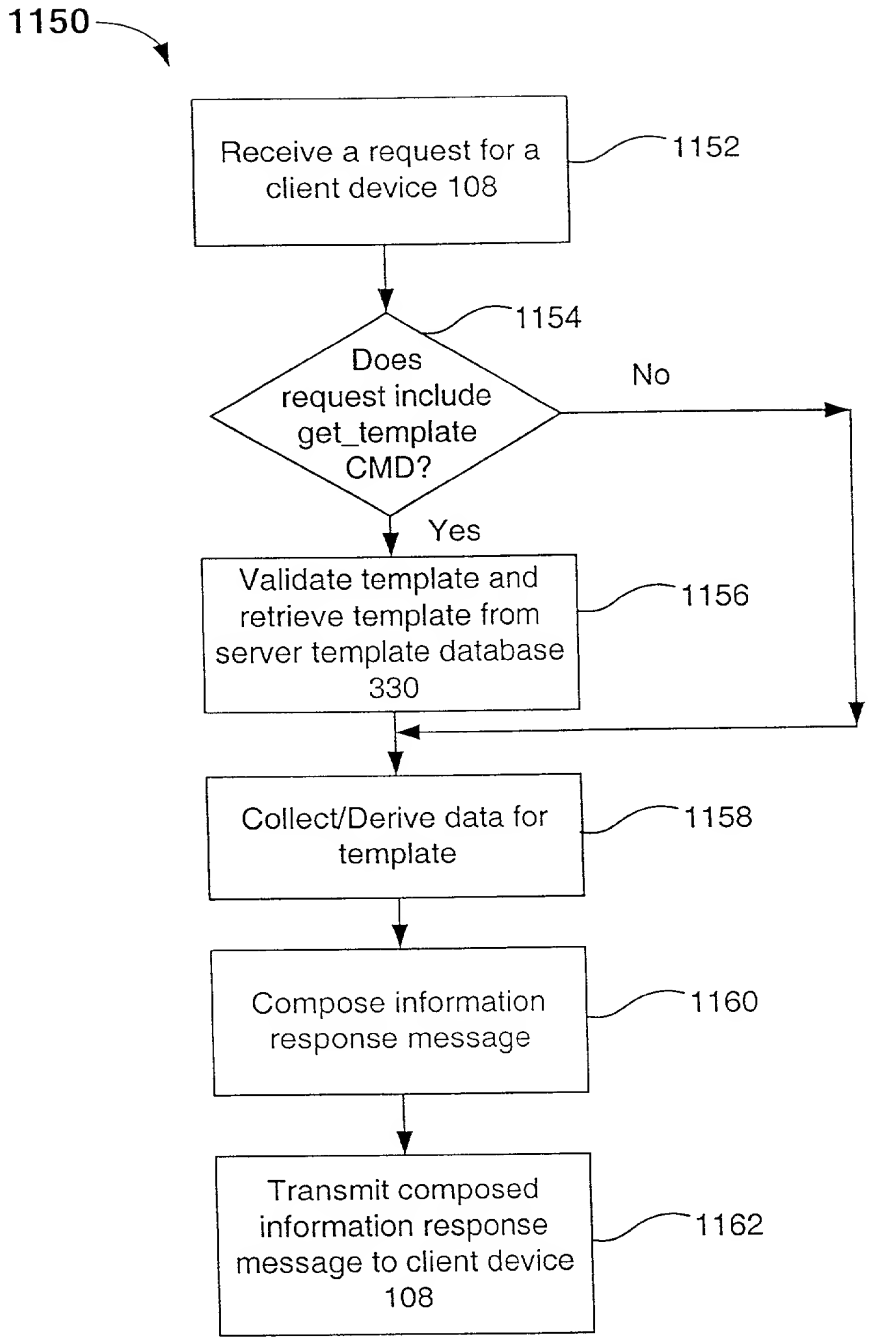

1150
Receive a request for a client device 108
1152
1154
Does request include get_template CMD?
No
Yes
Validate template and retrieve template from server template database 330
1156
Collect/Derive data for template
1158
Compose information response message
1160
Transmit composed information response message to client device 108
1162

FIG. 11A

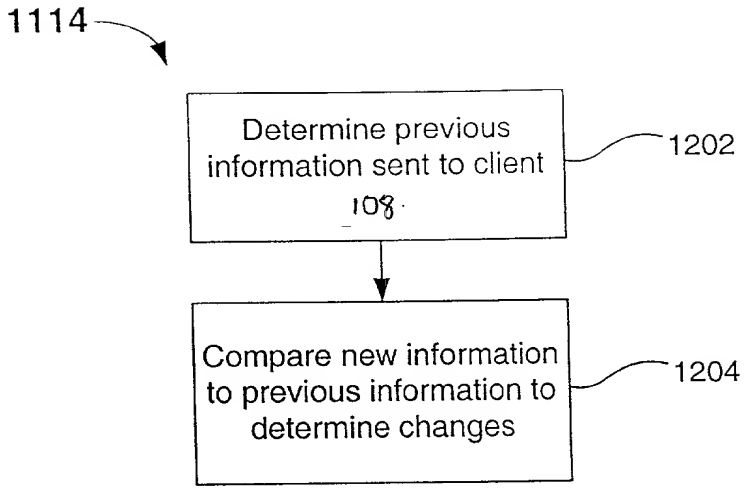


FIG. 12

Express Mail Label No. EV 339920545 US

PRECIOUS METALS 14:36		
S	5.10/5.24	+0.10
GOLD	28380/480	+0050
PL	43040/43500	-0700
PD	43900/44400	-0400

original

1302

PRECIOUS METALS 14:36		
S	5.20/5.24	+0.00
GOLD	28380/480	+0050
PL	43000/43500	0800
PD	43900/44400	-0400

new

1304

Changed fields

temp1~5.20/5.24~+0.10~~~43000/43500~-0800

Compressed Data

#Cx78n#;1

1306

1308

FIG. 13

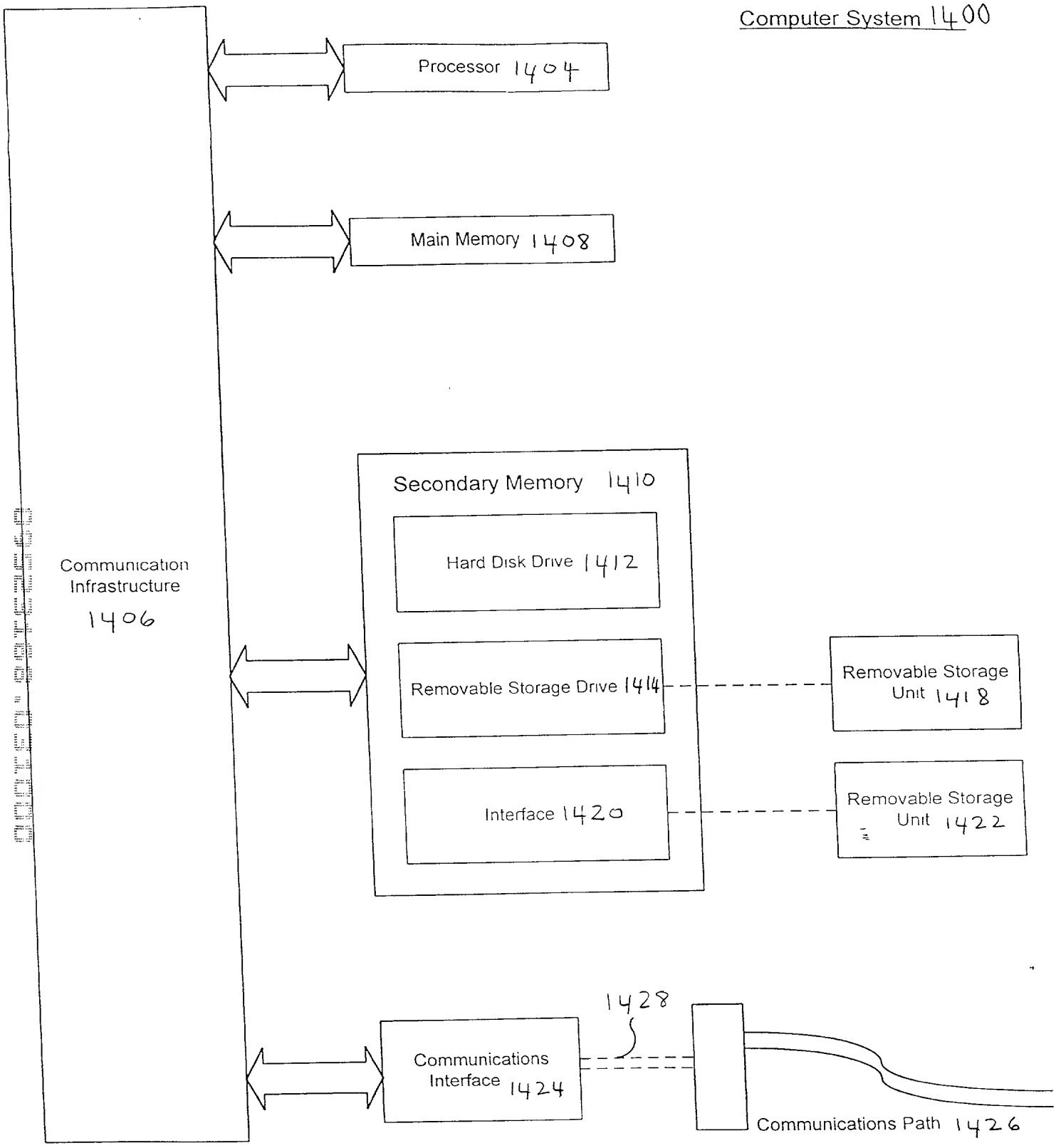

Computer System 1400
Processor 1404
Main Memory 1408
Secondary Memory 1410
Hard Disk Drive 1412
Removable Storage Drive 1414
Removable Storage Unit 1418
Interface 1420
Removable Storage Unit 1422
Communication Infrastructure 1406
1428
Communications Interface 1424
Communications Path 1426

FIG. 14